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Form 70C

(June 2012)

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If you wish to order a photocopy of your answer document—including, if you took the Writing Test, a copy of your written essay—please use the order form on the inside back cover of this booklet.

We hope that you will find this information helpful.

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P.O. BOX 168
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ENGLISH TEST

45 Minutes—75 Questions

DIRECTIONS: In the five passages that follow, certain words and phrases are underlined and numbered. In the right-hand column, you will find alternatives for the underlined part. In most cases, you are to choose the one that best expresses the idea, makes the statement appropriate for standard written English, or is worded most consistently with the style and tone of the passage as a whole. If you think the original version is best, choose "NO CHANGE." In some cases, you will find in the right-hand column a question about the underlined part. You are to choose the best answer to the question.

You will also find questions about a section of the passage, or about the passage as a whole. These questions do not refer to an underlined portion of the passage, but rather are identified by a number or numbers in a box.

For each question, choose the alternative you consider best and fill in the corresponding oval on your answer document. Read each passage through once before you begin to answer the questions that accompany it. For many of the questions, you must read several sentences beyond the question to determine the answer. Be sure that you have read far enough ahead each time you choose an alternative.

PASSAGE I

This Castle's Much Too Normal

It was late afternoon when my friends and I arrived,$_{1}$ at the Scottish castle, an old$_{2}$ structure of massive gray stones. The turrets piercing the sky and the gargoyles snarling$_{3}$ at us from every jagged ledge sent me straight into the Dark Ages. A forest crowded in on all sides as if trying to smother the castle, like$_{4}$ a dragon's tongue, a red flag snapped in the March wind. I was thrilled.

1. **A.** NO CHANGE
B. friends, and I, arrived
C. friends, and I arrived
D. friends and I arrived

2. Given that all the choices are true, which one best sets up the image of the castle as a scary place?
F. NO CHANGE
G. a forbidding
H. a visible
J. a solid

3. **A.** NO CHANGE
B. were snarling
C. snarled
D. snarl

4. **F.** NO CHANGE
G. castle. Like
H. castle like
J. castle,

Our spring break trip to Europe was low-budget. Lumpy beds, broken television sets, and inexpensive meals were the norm. But we had agreed [5] ahead of time to splurge on one night in a castle. In making our plans, a *Scooby-Doo* episode came to my mind as I pictured it. [6] I wanted a creepy castle. $\boxed{7}$

My hopes, however, were quickly dashed. A cheerful woman in a flower print dress greeted us. Her name was Pam. That didn't sound like the name of someone who lives in a castle. I was expecting Guinevere or Lady Larkspur. Chatting about laundry facilities and mealtimes, Pam led us through an entryway; [8] jumble of backpacks and umbrellas. [9] In the kitchen, she poured apple juice into plastic cups for her kids, who were finishing off a plate of animal crackers. This was not my idea of life in a castle. Where were the goblets? The torches? The spiderwebs and secret passageways?

Upstairs, things were no better. [10] A vase of fresh flowers sat next to a bowl of fruit on a gleaming table in our wallpapered bedroom. Everything smelled like soap and looked [11] like the inside of a cottage. I wanted haunted. I got homey.

5. A. NO CHANGE
   B. had to of agreed
   C. have agree
   D. agreed that

6. F. NO CHANGE
   G. an episode of *Scooby-Doo* filled my head with something to picture.
   H. I had pictured something out of a *Scooby-Doo* episode.
   J. something out of a *Scooby-Doo* episode filled my head with a picture.

7. Which of the following, if added here, would best reinforce the preceding sentence and set up the contrast with the castle's description in the next paragraph?
   A. *Scooby-Doo*, my favorite cartoon.
   B. The scarier the better.
   C. Just one night.
   D. Boo.

8. F. NO CHANGE
   G. us, through an entryway,
   H. us through an entryway
   J. us through an entryway,

9. A. NO CHANGE
   B. umbrellas through which she led us.
   C. umbrellas that were in the entryway.
   D. umbrellas there in the entryway.

10. Given that all the choices are true, which one begins the paragraph with the clearest sense of the narrator's reaction to the rest of the castle?
    F. NO CHANGE
    G. I found this castle on the Internet.
    H. The castle had several floors.
    J. Next, Pam took us upstairs.

11. A. NO CHANGE
    B. had smelled like soap and looked
    C. will smell like soap and look
    D. smells like soap and looks

That evening, no trapdoors opened, no monsters rumbled in the dungeon. Instead, we stumbled upon a cozy family room. The walls there were adorned in which there were [12] heartwarming messages in frames. Where there should have been tapestries of battle scenes, [13] we found photographs of cute kids and admirable creatures. [14]

The next morning after that night, [15] on the train to our next destination, we finally laughed at how "scary" our castle visit had been. Then we finished the last of the homemade muffins from Pam.

12. **F.** NO CHANGE
G. with which
H. in which
J. with

13. Which choice best sets up a contrast within the sentence and is consistent with the narrator's unfolding view of the castle as presented in the essay?
A. NO CHANGE
B. In the well-lit room where the family had gathered,
C. Looking around the cheerfully decorated room,
D. We were really not surprised by then when

14. Which choice best maintains the style and tone of the paragraph?
F. NO CHANGE
G. domesticated animals.
H. lovable pets.
J. noble beasts.

15. **A.** NO CHANGE
B. morning after the night before,
C. morning as we left the castle
D. morning,

PASSAGE II

Hawaii's Haleakala Ahinahina Plant

One of Earth's most spectacular plants grows on the slopes of Haleakala [16]. As a species, the Haleakala ahinahina thrived for thousands of years in this sometimes-harsh environment of high winds and subfreezing temperatures where almost no other plants would of been [17] able to survive.

16. At this point, the writer is considering adding the following accurate information (adjusting the punctuation as needed):

> a 10,023-foot volcano on the Hawaiian island of Maui

Should the writer make this addition here?
F. Yes, because it sets up a contrast with the height of other volcanoes described in the essay.
G. Yes, because it is relevant to the essay's focus on a particular plant and its habitat.
H. No, because it shifts the essay's focus from a plant to a volcano.
J. No, because the essay doesn't reveal whether there are other volcanoes on Maui.

17. **A.** NO CHANGE
B. could of been
C. were
D. was

[1] The dagger-shaped, lime green leaves 18 of the plant with a covering of 19 a dense layer of silvery hairs. [2] The plant lives from fifteen to fifty years and at the end of it's 20 life sprouts a dazzling stalk of maroon, sunflower-like blossoms. [3] The stalk may reach 21 a height of eight feet and bear up to six hundred flower heads. [4] By the 1920s, tourism and the introduction of cattle, goats, and other nonnative grazing animals 22 drove this plant to the brink of extinction. [5] Tourist's 23 decreased the plant population by taking home specimens as souvenirs. [6] They also inflicted harm which 24 unintentionally crushing the fragile roots when walking on the soil near the plant. [7] Even gently touching the Haleakala ahinahina can mean death for the plant, whose delicate silver hairs protect itself from 25 solar radiation and dehydration. [8] Moreover, the plant has none of the natural defenses—such as thorns, bitter-tasting foliage, or poisonous chemicals—that might otherwise protect it from grazing animals. 26

18. F. NO CHANGE
G. dagger-shaped, lime green, leaves
H. dagger-shaped, lime, green leaves
J. dagger-shaped lime green leaves,

19. A. NO CHANGE
B. being covered with
C. having a cover of
D. are covered with

20. F. NO CHANGE
G. their
H. its'
J. its

21. A. NO CHANGE
B. in terms of height reach
C. achieve to reach
D. reach and attain

22. F. NO CHANGE
G. animals, various factors
H. animals, in other words many forces
J. animals; they

23. A. NO CHANGE
B. Tourists of the time's
C. Tourists'
D. Tourists

24. F. NO CHANGE
G. by which
H. by
J. on

25. A. NO CHANGE
B. the plant under
C. oneself with
D. it from

26. The writer wants to divide this paragraph into two in order to separate description of the plant itself from information about harm that has been done to the plant population. The best place to begin the new paragraph would be at the beginning of Sentence:

F. 3.
G. 4.
H. 5.
J. 6.

In the 1920s, alarmed about being endangered,[27] the Maui Chamber of Commerce petitioned Congress, asking that a serious effort be made,[28] to save the plant. The first reliable count[29] of Haleakala ahinahina was made in the summer of 1935. At that time, 1,470 plants were tallied.

Over the past sixty years, the species has been protected by the National Park Service and has been written about.[30] Previous threats from animal grazing and human activities have been eliminated in large part because of fencing and rules prohibiting hikers from leaving established walking paths. As a result, today there are more than 40,000 Haleakala ahinahina growing in or around the volcano.

27. **A.** NO CHANGE
B. alarmed that the Haleakala ahinahina was endangered,
C. in the face of being endangered,
D. alarmed and endangered,

28. **F.** NO CHANGE
G. serious, effort be made
H. serious effort, be made
J. serious effort be made

29. **A.** NO CHANGE
B. worthy numbering
C. steadfast number
D. loyal count

30. Given that all the choices are true, which one best indicates that the conservation effort referred to in the preceding paragraph was successful?
F. NO CHANGE
G. been photographed by preservationists.
H. received considerable attention.
J. steadily recovered.

PASSAGE III

The Guerrilla Girls

[1]

The Guerrilla Girls are a group of women who use humor to protest sexism and racism in the art world and more![31] The group began in New York City, in 1985[32] a year after several of the future members protested at a major exhibition of contemporary art at the Museum of Modern Art.

31. **A.** NO CHANGE
B. in society as a whole.
C. in other stuff too.
D. all of that.

32. **F.** NO CHANGE
G. began, in New York City, in 1985,
H. began in New York City in 1985,
J. began, in New York City in 1985

GO ON TO THE NEXT PAGE.

Of the 166 artists displayed, the majority had their work shown in temporary exhibition space. [33] The show's curator proclaimed that any artist not appearing in the show should start rethinking "his" career. The protestors picketed outside the museum, but notice was not largely given to them by [34] passersby. So the future Guerrilla Girls generated an unusual strategy. [35]

[2]

To call attention more dramatically to issues of discrimination, the women started wearing gorilla masks at their public appearances; after [36] one member accidentally wrote *gorilla* instead of *guerrilla* on a poster. [A] They also assumed alternative names that were [37] the names of deceased female artists and writers, responding in interviews under the pseudonyms Frida Kahlo, Gertrude Stein, Käthe Kollwitz, and others. [38] By remaining anonymous, the Guerrilla Girls believe they avoid the distractions of individual personalities and call greater attention to the issues. [B]

33. Given that all the choices are true, which one would be most relevant to the main focus of the essay?

A. NO CHANGE
B. almost all were white and only sixteen were women.
C. forty-four were from the United States.
D. all of them had established reputations as artists at the time.

34. **F.** NO CHANGE
G. they went largely unnoticed by
H. it was not a largely noticeable protest for
J. largely noticeable it was not for the

35. Given that all the choices are true, which one most logically follows the preceding sentence and leads into the next paragraph?

A. NO CHANGE
B. continued protesting against discrimination.
C. considered the extent of racism and sexism in the art world.
D. talked about how irritated they were by the exhibit.

36. **F.** NO CHANGE
G. appearances after
H. appearances: after
J. appearances. After

37. **A.** NO CHANGE
B. adopted names that were
C. named themselves
D. adopted

38. The writer is considering deleting the phrase "responding in interviews under the pseudonyms Frida Kahlo, Gertrude Stein, Käthe Kollwitz, and others" from the preceding sentence (adjusting the punctuation as needed). If the writer were to make this deletion, the sentence would primarily lose:

F. an indication of many different places where the Guerrilla Girls used these names.
G. an explanation of why each Guerrilla Girl chose her particular name.
H. examples of artists and writers whom the Guerrilla Girls considered worthy of recognition.
J. details about the way interviewers react to the Guerrilla Girls' use of the pseudonyms.

[3]

The Guerrilla Girls create posters that often use statistics and almost always use sarcasm to expose the exclusion of women[39] and people of color from art exhibitions. [C] The Guerrilla Girls' materials also address a variety of topics, including body image and economic injustice. Starting with their first award in 1987,[40] the group has received honors for their books, posters, and performances. [D]

[4]

Guerrilla Girl members continue to tour[41] the United States and Europe, speaking on college campuses, at cultural centers, and to various media outlets. Being that they use[42] irreverent wit and satire, their protests have motivated many people to consider choosing a career in an artistic field.[43]

39. **A.** NO CHANGE
B. exclusion, of women,
C. exclusion of women,
D. exclusion, of women

40. Given that all the choices are true, which one most effectively helps the sentence establish a sense of how long the Guerrilla Girls have been seen as influential in their protests?

F. NO CHANGE
G. Sometimes fighting against the language used to describe artwork,
H. Also criticizing the Hollywood film industry,
J. Examining civil rights issues in other areas of society,

41. Which of the following alternatives to the underlined portion would NOT be acceptable?

A. are continuing to tour
B. tour and continue
C. continue touring
D. still tour

42. **F.** NO CHANGE
G. If it was
H. For use of
J. Using

43. Which of the following choices most effectively concludes the sentence and the essay by returning to the main purpose of the Guerrilla Girls' protests?

A. NO CHANGE
B. recognize inequality in and beyond the world of art.
C. contemplate the different styles of famous artists.
D. become more sarcastic in their approaches to important issues.

Questions 44 and 45 ask about the preceding passage as a whole.

44. Upon reviewing the essay and finding that some information has been left out, the writer composes the following sentence incorporating that information:

> For example, one of the posters asks, "If February is Black History Month and March is Women's History Month, what happens the rest of the year?"

This sentence would most logically be placed at Point:

F. A in Paragraph 2.
G. B in Paragraph 2.
H. C in Paragraph 3.
J. D in Paragraph 3.

45. Suppose the writer's goal had been to develop an essay that outlines the motivation behind and the achievements of an organized group. Would this essay accomplish that goal?

A. Yes, because it describes how the Guerrilla Girls began and some of the success they've experienced.
B. Yes, because it explains that the Guerrilla Girls have enjoyed some of their efforts so far.
C. No, because it doesn't provide the true identities of the members of the group that it describes.
D. No, because it fails to include a quotation from any of the organization's leaders.

GO ON TO THE NEXT PAGE.

PASSAGE IV

Tracking Time through Winter Counts

Lakota artist Emil Her Many Horses became fascinated by Lakota winter counts. While[46] he was working on an exhibit for the National Museum of the American Indian in 2001. "Winter counts" are pictorially[47] calendars that record, or count, the years by representing each year with a single picture. They're called *winter* counts because the Lakota measured a year from the first snowfall of one winter to the first snowfall of the next. Many surviving winter counts date from the nineteenth century and were drawn onto buffalo hides.

Each band or extended family group within the larger tribe kept its[48] own winter count. A council of elders will decide[49] which event the year should be remembered for such as, a crucial, buffalo hunt,[50] the death of a great chief, or a dramatic meteor shower. Over time,[51] a count would accumulate dozens of pictures that, arranged in rows or in a spiral, told the people's story.

46. **F.** NO CHANGE
G. counts; while
H. counts while
J. counts,

47. **A.** NO CHANGE
B. visually pictorially
C. visually pictorial
D. pictorial

48. **F.** NO CHANGE
G. our
H. it's
J. his

49. **A.** NO CHANGE
B. would decide
C. has decided
D. is deciding

50. **F.** NO CHANGE
G. for; such as, a crucial, buffalo hunt;
H. for, such as a crucial buffalo hunt,
J. for such as a crucial buffalo hunt

51. **A.** NO CHANGE
B. On the contrary,
C. Unexpectedly,
D. Otherwise,

Her Many Horses was inspired to revive the historical practice and creating[52] a new winter count for his own family. Likewise, he[53] talked about what to his relatives[54] had been important to them in the past year. Together, we[55] decided that the first year of their count should be remembered as "The Year Many Ceremonies Were Held at Wakpamani Lake." One of these ceremonies involved his niece throwing a handmade beaded ball, so Her Many Horses drew a picture showing a young woman in traditional dress tossing a ball. By becoming the family's winter count keeper, Her Many Horses took on the role of historian and storyteller. [56]

Thus, a winter count is essentially: a tool[57] for remembering. Each image brings to mind a cascade of stories and memories. History stays alive in the telling, as previous keepers must understand[58] each time they looked at the pictures on their winter count and started to speak.

52. **F.** NO CHANGE
G. creates
H. create
J. DELETE the underlined portion.

53. **A.** NO CHANGE
B. On the other hand, he
C. Instead, he
D. He

54. Which placement for the underlined portion is both logical and also indicates that Her Many Horses had a direct conversation with his relatives?

F. Where it is now
G. After the word *talked*
H. After the word *about*
J. After the word *been*

55. **A.** NO CHANGE
B. it was
C. they
D. he

56. Given that all of the following statements are true, which one, if added here, would best serve as a transition between the preceding sentence and the following one?

F. Winter counts were kept by various groups, including Blackfeet, Mandan, Kiowa, and Lakota.
G. Winter counts created in later years were sometimes created on paper or on muslin fabric.
H. Another project of Her Many Horses has been a book about Native American women's clothing.
J. The keeper's task is to pass on the oral history that accompanies each winter count.

57. **A.** NO CHANGE
B. essentially—a tool,
C. essentially, a tool
D. essentially a tool

58. **F.** NO CHANGE
G. have understand
H. have understood
J. understood

GO ON TO THE NEXT PAGE.

"It was the year that Walks Far brought back the gray horse with eagle feathers braided into its tail. . . ." [59]

59. Which of the following statements best explains the main function of the preceding sentence?

A. It lists the most important events that are depicted on this particular winter count.
B. It gives an example of what a keeper might have said based on a winter count.
C. It concludes the essay with a summary of the main purpose of winter counts.
D. It describes in detail the pictures that can be seen on one winter count.

> Question 60 asks about the preceding passage as a whole.

60. Suppose the writer's goal had been to write a brief essay about a historical Native American tradition that has been revived recently. Would this essay accomplish that goal?

F. Yes, because it explains that most historical winter counts have been kept up-to-date by their keepers.
G. Yes, because it illustrates how one family has begun to make its own winter count.
H. No, because it focuses only on historical winter counts, not on contemporary ones.
J. No, because it fails to place winter counts into their historical context.

PASSAGE V

Get the LED In

[1]

It was once 61 limited to the humble role of indicator light on devices such as TVs and radios, the light-emitting diode, or LED, 62 has emerged as a versatile, energy-efficient, and aesthetically pleasing source of illumination. [63] Designers today are using LEDs to create signs, displays, and area lighting that are both alluring and functional. [A]

61. **A.** NO CHANGE
B. At one time, it was
C. Once, it was
D. Once

62. Which of the following alternatives to the underlined portion would NOT be acceptable?

F. diode—LED for short—
G. diode, or LED
H. diode—LED—
J. diode (LED)

63. At this point, the writer is considering adding the following true statement:

> LEDs are still used as indicator lights, however.

Should the writer make this addition here?

A. Yes, because it offers an example illustrating the point made in the preceding sentence.
B. Yes, because it creates an effective lead-in to the essay's main point.
C. No, because it disrupts the flow of the paragraph by stating what's already implied.
D. No, because it contradicts the main claim made in the preceding sentence.

[2]

Long past are the days when LEDs—semiconductor diodes that produce light when electrical current is properly applied—could generate 64 only a low-intensity red light. Modern LEDs can be made to produce any color, including white; can be manufactured to generate infrared or ultraviolet light instead of visible light; and are able to yield 65 a high light output.

[3]

LEDs operate on extremely low voltages relative to standard (incandescent) bulbs. They also directly convert electrical current into light, thus eliminating the need to waste energy on first heating a filament that then radiates light. [B] In addition, LEDs last far 66 longer than standard bulbs. 67 Whereas a typical 75-watt incandescent bulb works for 750 hours. 68 LEDs can endure up to 50,000 hours of use. As the case may be, 69 LEDs are small, shock resistant, and (unlike another often-touted alternative light source, compact fluorescent bulbs) mercury free. 70 [C]

64. Which of the following alternatives to the underlined portion would NOT be acceptable?
F. were capable of generating
G. were able to generate
H. would generate
J. can generate

65. **A.** NO CHANGE
B. relinquish
C. surrender
D. cede

66. Which of the following alternatives to the underlined portion would NOT be acceptable?
F. considerably
G. a great deal
H. extremely
J. much

67. **A.** NO CHANGE
B. bulbs—that is, those of the incandescent type.
C. bulbs, which have a shorter life span.
D. bulbs, which aren't LEDs.

68. **F.** NO CHANGE
G. hours,
H. hours;
J. hours:

69. **A.** NO CHANGE
B. In view of the foregoing,
C. What's more,
D. To sum up,

70. **F.** NO CHANGE
G. mercury isn't present.
H. there's no mercury.
J. no mercury.

GO ON TO THE NEXT PAGE.

[4]

Commercial designers are among those rushing to catch up in their[71] LED use. The ceiling of an Atlantic City, New Jersey, shopping arcade supports 2,000 small color-changing LED nodes strung[72] on overhead cables to create the allusion of[73] a star field. [D] In Sweden, students programmed color-changing LED projectors to turn a small grove of trees into a "cathedral of light." LED road signs can consist of nothing more than block letters flashing out simple messages; they can, however, be as elaborate as giant billboards displaying vibrant full-color images.

[5]

LEDs are innovative—[74]they're costlier to manufacture than incandescents and are vulnerable to temperature extremes—but they offer numerous advantages over traditional lighting. The LED is a young technology with a bright future.

71. Which choice best conveys the idea that commercial designers are pioneers in LED use?

A. NO CHANGE
B. in the forefront of
C. now embracing
D. considering

72. **F.** NO CHANGE
G. stringed up
H. stringed
J. string

73. **A.** NO CHANGE
B. allusion for
C. illusion of
D. illusion to

74. Which choice most effectively sets up the rest of the sentence?

F. NO CHANGE
G. sometimes stop working—
H. have great visual appeal—
J. aren't perfect—

Question 75 asks about the preceding passage as a whole.

75. Upon reviewing the essay and finding that some information has been left out, the writer composes the following sentence incorporating that information:

> LEDs are energy efficient in another way: they produce more light per watt than incandescent bulbs.

If the writer were to add this sentence to the essay, it would most logically be placed at Point:

A. A in Paragraph 1.
B. B in Paragraph 3.
C. C in Paragraph 3.
D. D in Paragraph 4.

END OF TEST 1

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

MATHEMATICS TEST

60 Minutes—60 Questions

DIRECTIONS: Solve each problem, choose the correct answer, and then fill in the corresponding oval on your answer document.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

You are permitted to use a calculator on this test. You may use your calculator for any problems you choose, but some of the problems may best be done without using a calculator.

Note: Unless otherwise stated, all of the following should be assumed.

1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word *line* indicates a straight line.
4. The word *average* indicates arithmetic mean.

DO YOUR FIGURING HERE.

1. The table below gives the heart rates, in beats per minute (bpm), for 8 participants in a fitness study after each participant completed 45 minutes of aerobic exercise. What is the mean heart rate of the 8 participants, to the nearest 0.1 bpm ?

Participant	Heart rate (bpm)
1	130
2	155
3	162
4	148
5	177
6	162
7	170
8	156
Sum	1,260

A. 137.3
B. 153.5
C. 157.5
D. 162.0
E. 162.5

2. The top surface of a rectangular table has an area of 144 square feet and a width of 4 feet. What is the length, in feet, of the surface?

F. 12
G. 32
H. 36
J. 140
K. 576

3. The price of a coat decreased from \$50 to \$40. The price decreased by what percent?

A. 10%
B. 14%
C. 15%
D. 20%
E. 25%

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

4. Chang, a store employee, asked each of 50 customers which 1 of 4 shirt colors the customer preferred. The number of customers who preferred each color is given in the table below.

Color	Number of customers
Red	15
White	22
Blue	5
Gray	8
Total	50

Chang will order 500 shirts in the proportions, by color, in the table. How many gray shirts will he order?

F. 8
G. 16
H. 40
J. 80
K. 125

5. Belinda plans to use landscaping timbers to build a border for her 8-foot-by-12-foot rectangular garden. To determine the number of timbers she needs, she must calculate the perimeter of the garden. What is the perimeter, in feet, of the garden?

A. 20
B. 24
C. 40
D. 48
E. 96

6. At Nikki's Necklaces, the total production cost to produce necklaces consists of an operational cost of \$300 per day, plus a material cost of \$10 per necklace produced. For a day in which n necklaces are produced, which of the following expressions gives that day's total production cost, in dollars, to produce necklaces?

F. $-10n + 300$
G. $10n - 300$
H. $10n + 300$
J. $300n - 10$
K. $300n + 10$

7. The first question on a 2-question quiz offers 2 answers, and exactly 1 answer must be chosen. The second question offers 5 answers, and exactly 1 answer must be chosen. The quiz has how many possible combinations of answers?

A. 5
B. 10
C. 20
D. 25
E. 100

DO YOUR FIGURING HERE.

8. For what value of x is the equation $2(x - 6) + x = 36$ true?

F. 8
G. 10
H. 14
J. 16
K. 24

9. What value of a will make the equation $\frac{4+a}{9+a} = \frac{2}{3}$ true?

A. −19
B. 3
C. 5
D. 6
E. 30

10. The 1st term in the geometric sequence below is −6. If it can be determined, what is the 6th term?

$$-6, 12, -24, 48, -96, \cdots$$

F. 192
G. 144
H. −144
J. −192
K. Cannot be determined from the given information

11. In the standard (x,y) coordinate plane, A has coordinates $(-4,-9)$. Point A is translated 4 units to the right and 9 units up and labeled A'. What are the coordinates of A' ?

A. $(-13,-13)$
B. $(-8,-18)$
C. $(-4,-18)$
D. $(0, 0)$
E. $(8, 18)$

12. A formula used to compute the volume, V, of a rectangular prism is $V = lwh$, where l is the length of the base, w is the width of the base, and h is the height of the prism. What is the height, in centimeters, of a rectangular prism that has a volume of 510 cubic centimeters and a base that measures 5 centimeters by 12 centimeters?

F. 8.5
G. 30
H. 42.5
J. 102
K. 450

GO ON TO THE NEXT PAGE.

13. Solar panels that produce 150 amps of electric current each are needed for a proposed space station. If the solar panels are manufactured to produce 0.75 amps per square meter of surface area, the surface area of each solar panel needs to be how many square meters?

A. 20
B. 75
C. 112.5
D. 150
E. 200

14. If cantaloupes sell at $1.49 each or 3 for $3.90, how much is saved, to the nearest cent, on each cantaloupe by buying them 3 at a time?

F. 12¢
G. 19¢
H. 31¢
J. 47¢
K. 92¢

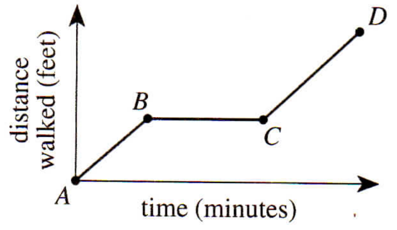
15. Which of the following expressions is equivalent to $(4ab^2)(3a^4b^3)$?

A. $7a^4b^6$
B. $7a^5b^5$
C. $12a^4b^5$
D. $12a^4b^6$
E. $12a^5b^5$

16. In the standard (x,y) coordinate plane, the coordinates of the endpoints of $\overline{DM}$ are (11,3) and (17,15). What is the y-coordinate of the midpoint of $\overline{DM}$?

F. 7
G. 9
H. 14
J. 16
K. 18

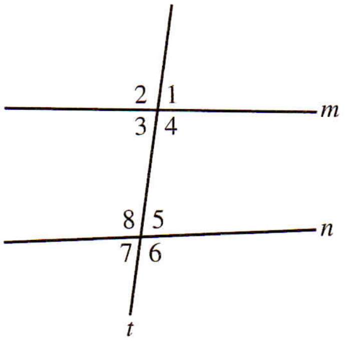
17. The distance-versus-time graph below represents Barbara Jean's walk to school on Friday.



Which of the following statements could describe what Barbara Jean did during the time interval covered by the horizontal line segment $\overline{BC}$?

A. She walked due east.
B. She walked up some steps.
C. She walked on level ground.
D. She walked at a faster speed.
E. She stopped to talk to friends.

18. In the diagram below, lines *m* and *n* are cut by transversal *t*. Lines *m* and *n* are NOT parallel. Which of the following statements *must* be true?



F. $\angle 1 \cong \angle 2$
G. $\angle 1 \cong \angle 3$
H. $\angle 1 \cong \angle 5$
J. $\angle 2 \cong \angle 6$
K. $\angle 3 \cong \angle 5$

DO YOUR FIGURING HERE.

19. The expression $5 - 3(2x - 1)$ is equivalent to:

A. $-2 + 4x$
B. $2 - 6x$
C. $8 - 6x$
D. $8 - 5x$
E. $9 - 6x$

20. Which of the following angle measures CANNOT be the measure of any angle in an obtuse triangle?

(Note: An obtuse triangle is a triangle that has 1 angle with a measure greater than 90° but less than 180°.)

F. 30°
G. 37°
H. 60°
J. 90°
K. 126°

21. What is the value of $f(-5)$ when $f(x) = \dfrac{-3(x^2 + 3x + 2)}{15x + 15}$?

A. $-\frac{19}{10}$

B. $-\frac{3}{5}$

C. $\frac{3}{5}$

D. $\frac{12}{25}$

E. $\frac{19}{10}$

DO YOUR FIGURING HERE.

22. In the standard (x,y) coordinate plane, what is the slope of the line with equation $3x + 2y = 6$?

F. -3

G. $-\frac{3}{2}$

H. $-\frac{2}{3}$

J. $\frac{2}{3}$

K. $\frac{3}{2}$

23. Which of the following is a simplified form of $\sqrt{20} - \sqrt{45}$?

A. $-\sqrt{5}$
B. -5
C. 5
D. $5\sqrt{5}$
E. $\sqrt{65}$

24. A formula for simple interest is $I = Prt$, where I is the interest in dollars, P is the principal in dollars, r is the annual interest rate expressed as a decimal, and t is the time in years the money is invested. Which of the following expressions gives t when the annual interest rate is 5% ?

F. $\frac{I}{0.05P}$

G. $\frac{I}{0.5P}$

H. $\frac{I}{5P}$

J. $\frac{0.5I}{P}$

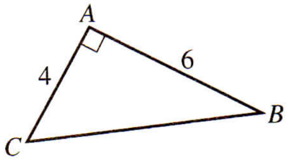
K. $0.05IP$

25. When $t = 2{,}005$, the value of the function $f(t)$ is 100 more than twice the value of $f(t)$ when $t = 1{,}998$. Which of the following equations expresses this relationship?

A. $f(2{,}005) = 2f(1{,}998) + 100$
B. $f(1{,}998) = 2f(2{,}005) + 100$
C. $f(t) = 2f(t) + 100$
D. $f(t + 2{,}005) = 2f(t + 1{,}998) + 100$
E. $f(2{,}005) + 100 = 2f(1{,}998)$

Use the following information to answer questions 26–28.

Shown below is right triangle $\triangle ABC$ with the given dimensions in meters.



26. What is the length, in meters, of $\overline{BC}$?

F. 8
G. 10
H. $\sqrt{10}$
J. $\sqrt{20}$
K. $\sqrt{52}$

27. Which of the following statements about the measures of the interior angles in $\triangle ABC$ is true?

(Note: $m\angle A$ represents the degree measure of $\angle A$.)

A. $m\angle A = m\angle B$
B. $m\angle B = m\angle C$
C. $m\angle A = m\angle B + m\angle C$
D. $m\angle B + m\angle C = 180°$
E. $m\angle A + m\angle B + m\angle C = 360°$

28. Which of the following expressions represents cos B ?

F. $\frac{AB}{AC}$

G. $\frac{AB}{BC}$

H. $\frac{AC}{BC}$

J. $\frac{AC}{AB}$

K. $\frac{BC}{AB}$

---

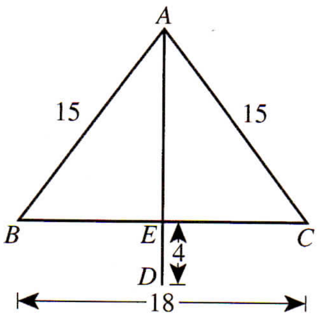
29. Given the functions f and g defined by $f(x) = x + 3$ and $g(x) = x^2 + 1$, what is the value of $f(g(1))$?

A. 2
B. 5
C. 6
D. 8
E. 17

30. Which of the following expressions is equivalent to $(3x^2)^3$?

F. $3x^5$
G. $3x^6$
H. $9x^5$
J. $9x^6$
K. $27x^6$

31. Marsha is making a sail for a model boat. In the figure below, the sail is represented by $\triangle ABC$. Base $\overline{BC}$ is 18 inches long, and legs $\overline{AB}$ and $\overline{AC}$ are each 15 inches long. The mast, represented by $\overline{AD}$, is perpendicular to the base and extends 4 inches below the bottom of the sail. How many inches long is the mast?



A. 12
B. 16
C. 33
D. $3\sqrt{11}$
E. $3\sqrt{11} + 4$

32. Which of the following inequalities orders the numbers below from least to greatest?

$$3\tfrac{3}{7},\ -(-3.5),\ 3\tfrac{2}{5}$$

F. $-(-3.5) < 3\frac{2}{5} < 3\frac{3}{7}$
G. $-(-3.5) < 3\frac{3}{7} < 3\frac{2}{5}$
H. $3\frac{3}{7} < 3\frac{2}{5} < -(-3.5)$
J. $3\frac{2}{5} < -(-3.5) < 3\frac{3}{7}$
K. $3\frac{2}{5} < 3\frac{3}{7} < -(-3.5)$

DO YOUR FIGURING HERE.

Use the following information to answer questions 33–35.

The table below gives the prices for dog grooming at Pretty Pooches.

Size of dog	Shampoo	Haircut
Small	\$20	\$30
Large	\$35	\$55

33. Hoakoa brought 10 dogs to Pretty Pooches and paid \$260 to have all 10 shampooed. How many large dogs did Hoakoa have shampooed?

A. 2
B. 4
C. 5
D. 6
E. 7

34. Jim took his large dog to Pretty Pooches for a haircut 3 times. Jim paid full price for the first 2 haircuts, and had a coupon for the 3rd haircut, giving him a 15% discount on the 3rd haircut. How much did Jim pay for the 3 haircuts?

F. \$ 99.75
G. \$118.25
H. \$137.50
J. \$150.00
K. \$156.75

35. When the owner of Pretty Pooches increases the price to have a small dog shampooed, the number of small dogs shampooed per day decreases. The expression $ax + b$ represents the number of small dogs shampooed in 1 day whenever the price is x dollars per dog. The number of small dogs shampooed per day was 12 when the price in the table was in effect. The number of small dogs shampooed per day decreases by 2 for every \$5 increase in price. What are the values of a and b ?

	$\underline{a}$	$\underline{b}$
A.	$-\frac{5}{2}$	62
B.	$-\frac{2}{5}$	20
C.	$\frac{2}{5}$	4
D.	2	200
E.	5	2

GO ON TO THE NEXT PAGE.

36. $\dfrac{1}{1+\dfrac{1}{1+\frac{1}{2}}} = ?$

DO YOUR FIGURING HERE.

F. $\frac{5}{3}$

G. $\frac{3}{2}$

H. $\frac{3}{4}$

J. $\frac{2}{3}$

K. $\frac{3}{5}$

37. In the standard (x,y) coordinate plane, what is the x-intercept of the line represented by $y = -2x + 8$?

A. -4
B. -2
C. 2
D. 4
E. 6

38. A toy rocket is launched from the ground. Its height, h feet above the ground, t seconds after it is launched, is given by $h = -16t^2 + 48t$. During the rocket's ascent, at what value of t is the rocket 32 feet above the ground?

F. $\frac{1}{2}$

G. $\frac{2}{3}$

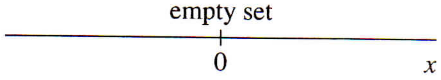
H. 1

J. 2

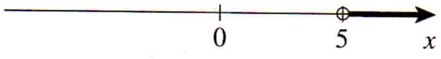
K. 3

39. Which of the following graphs illustrates the solution set for the system of inequalities $3x - 2 > 9$ and $-2x > -10$?

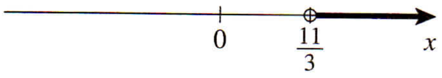
A.



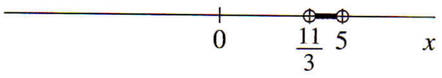
B.



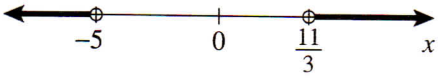
C.



D.



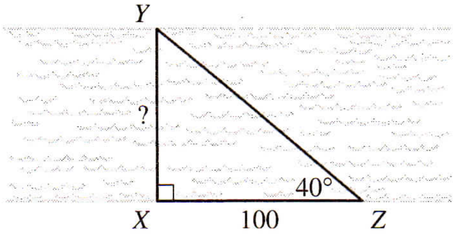
E.



40. A cab picks up a passenger at a point that is designated on the map as (7,–3) and is 7 miles east and 3 miles south of the cab company's headquarters. From (7,–3), the cab travels 4 miles due north, 5 miles due east, and then 2 miles due west, where the passenger is dropped off. Which of the following is closest to the straight-line distance, in miles, the cab is from the cab company's headquarters?

F. 21
G. 17
H. 14
J. 10
K. 8

41. During a competition, a swimmer will be swimming the width of a river, from *X* to *Y* in the figure below. The swimmer wants to know how wide the river is. The right triangle shows the measurements the swimmer obtained by walking 100 feet from *X* to *Z*, sighting to *Y* from both points. From this sighting, it is determined that the measure of ∠*Z* is 40°. How wide, in feet, is the river?



A. $\frac{100}{\sin 40^\circ}$

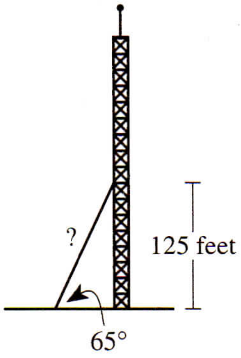
B. $\frac{100}{\tan 40^\circ}$

C. $100 \sin 40^\circ$

D. $100 \cos 40^\circ$

E. $100 \tan 40^\circ$

42. The figure below shows a support wire for a television transmission tower. The wire, which is fastened to the tower at a point 125 feet above the level ground, has an angle of elevation of 65°. Which of the following expressions gives the length, in feet, of the wire?



F. $\frac{125}{\sin 65^\circ}$

G. $\frac{125}{\cos 65^\circ}$

H. $\frac{125}{\tan 65^\circ}$

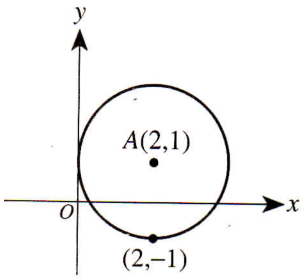
J. $125 \sin 65^\circ$

K. $125 \tan 65^\circ$

43. A circle is inside a rectangle 6 inches wide and 8 inches long and is tangent to 3 sides of the rectangle. What is the area, in square inches, of the circle?

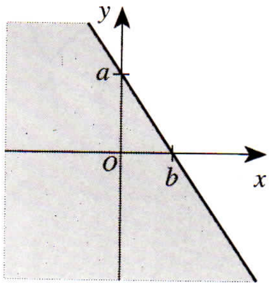
A. 6π
B. 8π
C. 9π
D. 16π
E. 36π

44. Which of the following equations represents the circle with center (2,1) shown in the standard (x,y) coordinate plane below?



F. $(x-2)^2+(y-1)^2=2$
G. $(x-2)^2+(y-1)^2=4$
H. $(x-2)^2+(y+1)^2=4$
J. $(x+2)^2+(y+1)^2=2$
K. $(x+2)^2+(y+1)^2=4$

45. One of the following inequalities, where both constants a and b are positive real numbers, is graphed in the standard (x,y) coordinate plane below. Which inequality is it?



A. $y \ge -\frac{a}{b}x + a$

B. $y \le -\frac{a}{b}x + a$

C. $y \le -\frac{b}{a}x + a$

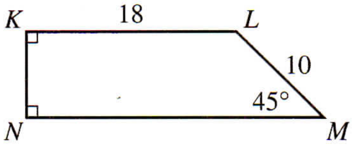
D. $y \le \frac{b}{a}x$

E. $y \le \frac{a}{b}x + a$

46. Circles A, B, and C have diameters of x inches, $2x$ inches, and $4x$ inches, respectively. What is the ratio of the *radius* of Circle B to the *diameter* of Circle A ?

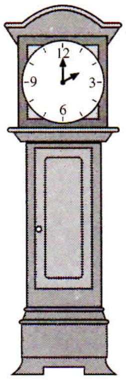
F. 1:1
G. 1:2
H. 1:4
J. 2:1
K. 4:1

47. In trapezoid $KLMN$ shown below, $\angle M$ measures 45° and $\angle K$ and $\angle N$ are both right angles. The given side lengths are in feet. Which of the following values is closest to the area, in square feet, of $KLMN$?



A. 4
B. 7
C. 43
D. 127
E. 152

48. For the 2 o'clock hour on Milena's grandfather clock (shown below), the bell is struck 2 times. For the 3 o'clock hour, the bell is struck 3 times. For every hour, 2 seconds elapse between consecutive strikes of the bell. For the 9 o'clock hour, how many seconds elapse between the 1st strike of the bell and the 9th strike of the bell?



F. 8
G. 9
H. 11
J. 16
K. 18

49. For positive real numbers a, b, and c such that $2a = 3b$ and $\frac{1}{4}b = \frac{1}{2}c$, which of the following inequalities is true?

A. $c < b < a$
B. $c < a < b$
C. $b < c < a$
D. $b < a < c$
E. $a < b < c$

DO YOUR FIGURING HERE.

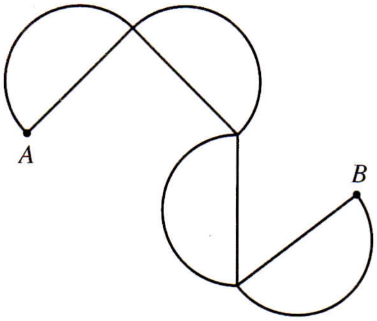
50. This month, Malcolm has \$100 saved, and his goal is to have a total of \$310 saved 12 months from now. After adding to his savings next month, each month he will add \$1 more than what he added the previous month. For the next 12 months, Malcolm will not remove any money from what he has already saved. What is the minimum amount of money Malcolm must add to his savings next month so that he reaches his goal?

F. \$12
G. \$17
H. \$18
J. \$26
K. \$34

51. For all pairs of nonzero real numbers a and b, the product of the complex number $a + bi$ and which of the following complex numbers is a real number?

A. abi
B. $a + bi$
C. $a - bi$
D. $b + ai$
E. $b - ai$

52. Four congruent semicircles touch only at their corners, as shown in the figure below. If the path from A to B along the diameters of the semicircles is 100 centimeters long, how many centimeters long is the path from B back to A along the arcs of these semicircles?



F. 25π
G. 50π
H. 100π
J. 150π
K. 230π

53. For all $a > 1$, which of the following statements describes the function g defined by $g(x) = a^{-x}$?

A. g is constant for all x
B. g is increasing for $x \geq 0$
C. g is decreasing for $x \geq 0$
D. g is increasing for $0 \leq x < 1$ and decreasing for $x \geq 1$
E. g is decreasing for $0 \leq x < 1$ and increasing for $x \geq 1$

54. A magnet attracts a nail with a force that varies inversely with the square of the distance between them. The nail is 12 inches from the magnet. How many inches from the magnet would the nail need to be to have twice as much attractive force on it as it currently has?

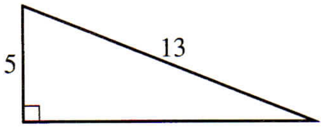
F. $\sqrt{2}$
G. 3
H. 6
J. $6\sqrt{2}$
K. $12\sqrt{2}$

55. What is the area, in square meters, of a rhombus (a parallelogram having 4 congruent sides) with side length 4 meters and 2 angles that each measure 60° ?

A. $8\sqrt{3}$
B. $16\sqrt{3}$
C. 8
D. 24
E. 48

56. The right triangle shown below with hypotenuse 13 inches long and vertical leg 5 inches long is rotated 360° around the vertical leg to form a right circular cone. What is the volume of this cone, in cubic inches?

(Note: $V = \frac{1}{3}\pi r^2 h$, where V is the volume, r is the radius, and h is the height.)



F. $\frac{80}{3}\pi$
G. 40π
H. $\frac{320}{3}\pi$
J. 240π
K. 960π

57. Which of the following fractions is equal to $\frac{1}{11^{20}} - \frac{1}{11^{21}}$?

A. $\frac{1}{11^{21}}$
B. $\frac{1}{11^{22}}$
C. $\frac{1}{11^{40}}$
D. $\frac{10}{11^{21}}$
E. $\frac{10}{11^{41}}$

DO YOUR FIGURING HERE.

58. Which of the following is equal to $\tan\theta\cos\theta$ when $\sin\theta = \frac{2}{3}$ and $0 < \theta < \frac{\pi}{2}$?

F. $\frac{2}{3}$

G. $\frac{2\sqrt{5}}{9}$

H. $\frac{\sqrt{5}}{3}$

J. $\frac{2\sqrt{5}}{5}$

K. 1

59. An equilateral triangle is partitioned into 4 smaller congruent equilateral triangles. What is the ratio of the perimeter of 1 of the smaller triangles to the perimeter of the original triangle?

A. $\frac{1}{6}$

B. $\frac{1}{5}$

C. $\frac{1}{4}$

D. $\frac{1}{3}$

E. $\frac{1}{2}$

60. If $|x| = -x$, which of the following statements *must* be true?

F. $x \le 0$
G. $x \ge 0$
H. $x = 0$
J. $x \ne 0$
K. x is not a real number.

END OF TEST 2

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

DO NOT RETURN TO THE PREVIOUS TEST.

READING TEST

35 Minutes—40 Questions

DIRECTIONS: There are four passages in this test. Each passage is followed by several questions. After reading a passage, choose the best answer to each question and fill in the corresponding oval on your answer document. You may refer to the passages as often as necessary.

Passage I

PROSE FICTION: This passage is adapted from the short story "Tattoo" by Rai a Mai (©2006 by University of Hawai‘i Press).

The first time I heard about tattoo, I was still a little girl. My grandmother was telling me that the last woman in Polynesia to have the face entirely tattooed in those days was living in Hiva‘Oa.

"She would often come down to the village by the shore. Maybe because she loved the ocean . . . Her whole face was tattooed and her hands and feet. For the body, I could not tell because she was always wrapped in *tapa* cloth. I used to play with the other village children at the shore. And she would come and just sit there, under the sun, for hours. She would stare silently at the sea. Not moving. Not talking. Not smiling. Not looking at anyone. Her eyes on the sea, as if captivated by these ever-rolling waves. Her body leaning with intensity toward the ocean, as if her whole being was listening to something we could not hear.

"I like people who can sit under the sun without moving and without talking, their eyes filled with dreams from another world . . .

"I was probably about your age when my parents decided to migrate to the Marquesas Islands. You know, child, the people over there have skin different from ours. Mine is black. This is Pa‘umotu skin! Yours is white because you have in you the mixed blood of your ancestors. But theirs is a beautiful reddish color, like *ahi mono‘i*, made from sandalwood and powder. The way they speak is also different. When they speak, you hear a song. They sound like the white birds that fly over the cliffs along the shoreline just before the rain.

"Yes . . . I do like people who can sit under the sun without moving and without talking, their eyes filled with dreams from another world . . .

"So when we played *tāpō*, I would hide behind a rock not too far away from the tattoo lady and I would imitate her. I would sit against the rock and feel the pleasure of the sunrays trapped in the rock warming my back. I'd close my eyes, breathe deeply, and feel the sunrays on my eyelids. Then I would open my eyes again and just stare at the sea . . . I tried to hear what she was hearing . . .

"But you see, child, I didn't have any tattoo around my eyes, and I couldn't see what she saw. I didn't have any tattoo around my lips and on my chin, and I couldn't shut my mouth for very long. I didn't have any tattoo on my forehead, and I couldn't concentrate on the ocean's language.

"Sometimes the tattoo lady would lift her hands up toward the sky. And from her hands would dance a few words among the clouds from Heaven. See, child, her hands were beautifully tattooed on the side of the palm and along the small fingers. At times, she would catch a word and bring it back to her chest, as if to bury it in her heart.

"I would see, then, tears run along the tattoo on her face . . .

"So I went to see my father and told him that I wanted a tattoo somewhere on my body. I said that I wanted to be able to hear what others couldn't hear. I said that I wanted to catch the words from among the clouds from Heaven.

"My father looked at me, opened his mouth. But no word came out of it. Then he closed his mouth again and just looked at me. He drew me against him and sat me on his lap. With his arms wrapped around me, he chanted. He sang like the white birds that fly over the cliffs along the shoreline just before the rain.

"Then he said, 'We used to tell our story on our body. And people and heavens would know who we were. They would recognize us. But nowadays, stories and words are written in books. The words are caught directly from our memories and written with ink on paper. You don't need to catch the words in the clouds from Heaven any longer. They are here!' And he pointed a finger to my forehead.

"So you see, child," my grandmother went on, "today no one has Polynesian tattoo on their body anymore. Well . . . some men bring back tattoo from the army. But theirs tell not of war; they speak of love and broken hearts. They draw a heart pierced by an arrow . . . They draw the name of a woman they fell in love with . . . They are unfinished designs. In fact, nobody knows how to tattoo the way our ancestors did. They have forgotten.

"Our word *tātau* has traveled all over the world and is known by all the nations. It has become such a part of everyone's language that people have forgotten that originally this word was a Polynesian word: *tātau! Tātau* has disappeared from our memories . . .

"And you know what? I was never able to catch any words: neither in books nor from among the clouds from Heaven."

As I listened to my grandmother, I looked at her naked black hands and I felt the desire for words to grow inside me.

1. In the passage, the narrator's grandmother states that one reason she spent time at the shore was to:

A. watch the white birds.
B. play with other children.
C. learn about the Pa'umotu people.
D. practice singing in the language of the Marquesas Islands.

2. The main purpose of the fourth paragraph (lines 20–29) is to:

F. explain why the narrator's great-grandparents moved to the Marquesas Islands.
G. describe the narrator's grandmother's impression of the people of the Marquesas Islands.
H. illustrate why the narrator's grandmother felt at home with the Pa'umotu people.
J. discuss the practice of tattooing on the Marquesas Islands.

3. The passage's repetition in lines 65–66 of the simile used in lines 28–29 creates a direct connection between the Marquesas Islanders' speech and the:

A. staring the tattoo lady does by the ocean.
B. longing the narrator has for words.
C. singing of the narrator's grandmother.
D. chanting of the narrator's great-grandfather.

4. In the passage, the narrator's grandmother suggests that having a tattoo would have allowed her to do all of the following EXCEPT:

F. sit still for long periods of time under the sun.
G. hear things others could not.
H. speak to others in a calm voice.
J. catch words from the clouds.

5. The thirteenth and fourteenth paragraphs (lines 75–88) differ from the rest of the passage in that these paragraphs are composed of the:

A. narrator encouraging her grandmother to record on paper the story of the tattoo lady.
B. narrator explaining why her grandmother decided against getting a tattoo.
C. narrator's grandmother discussing Polynesian tattooing in a larger historical and geographical context.
D. narrator's grandmother stating her reasons for working to re-create the practice of Polynesian tattooing.

6. As it is used twice in line 1, the word *I* directly refers to the:

F. narrator.
G. narrator's grandmother.
H. narrator's great-grandfather.
J. tattoo lady.

7. In the passage, the narrator's grandmother speculates that the tattoo lady came down to the village by the shore because the tattoo lady:

A. loved the ocean.
B. liked to watch the children play.
C. wanted to be where there was silence.
D. had previously lived far from the ocean.

8. The passage indicates that when the narrator's grandmother tried to imitate the tattoo lady, the narrator's grandmother found the heat of the sun to be:

F. distracting.
G. sedating.
H. astonishing.
J. pleasing.

9. The designs of the tattoos on men in the army are portrayed in the passage by the narrator's grandmother as being:

A. incomplete.
B. rebellious.
C. traditionally Polynesian.
D. revered.

10. In the passage, the phrase "the desire for words to grow inside me" (lines 93–94) is best described as the:

F. narrator's grandmother's paraphrase of a quote from the tattoo lady.
G. narrator's grandmother's realization that she finally understood the tattoo lady.
H. narrator's emotional reaction to hearing the grandmother's story.
J. narrator's critique of the grandmother's story.

Passage II

SOCIAL SCIENCE: This passage is adapted from the article "10 Moments that Made American Business" by John Steele Gordon (©2007 by American Heritage Publishing).

The cost of overland transportation had been a limiting factor in the world economy since time immemorial. Any material with a low value-to-weight ratio, such as foodstuffs, that couldn't be transported to distant markets by water couldn't be sold in those markets at a price anyone would pay. This meant that national economies were fragmented into an infinity of local ones.

Until the Industrial Revolution, there was only one way to reduce these transportation costs: build artificial rivers. By the end of the eighteenth century England was well laced with canals, greatly facilitating industrialization as factories could sell their goods profitably throughout the entire country.

But the new United States was 10 times the size of England and far less developed. And a considerable mountain range divided the more developed eastern seaboard from the fertile, resource-rich, and rapidly growing West. Settlers west of the Appalachians had no choice but to send their crops down the Mississippi to market.

Along the whole great chain of mountains that stretched from Maine to Alabama, there was only a single gap—where the Mohawk River tumbles into the Hudson near Albany—at which a canal was even theoretically possible.

The idea of building a canal to connect the Hudson with the Great Lakes there had been around for many years but always dismissed as hopelessly impracticable. Even Thomas Jefferson thought the idea "little short of madness." DeWitt Clinton, however, did not. Born into a prominent New York family (his uncle had been governor of New York and then Vice President under James Madison), Clinton would be the mayor of New York City and governor of the state for most of the first quarter of the nineteenth century. A shrewd politician, he built public support for the canal and pushed it through a reluctant state legislature.

One can understand the reluctance, for the project was huge by the standards of the day. At 363 miles the Erie would be by far the longest canal in the world. It would require moving, largely by hand, 11.4 million cubic yards of earth and rock—well over three times the volume of the Great Pyramid of Egypt—and building 83 locks in what was still a semiwilderness. The budget, seven million dollars, was about equal to one percent of the gross domestic product of the entire country. Nonetheless, when the federal government refused to help, New York decided to go it alone. It was a gigantic roll of the economic dice, but one that paid off beyond even Clinton's dreams. The Erie Canal put the Empire in the Empire State.

The canal was a success even before it fully opened, as traffic burgeoned on the completed parts, helping fund continuing construction. When it was finished in 1825, ahead of schedule and under budget, traffic was tremendous from the start. It is not hard to understand why. Before, it had taken three weeks and cost $120 to ship a ton of flour from Buffalo to New York City. With the canal, it took eight days and cost $6.

Produce that had gone down the Mississippi to New Orleans now began to flow eastward. In a few years the Boston poet and physician Oliver Wendell Holmes (father of the Supreme Court justice) described New York as "that tongue that is licking up the cream of commerce and finance of a continent." In 1800 about 9 percent of American exports passed through the port of New York. By 1860 it was 62 percent.

With the opening of the Erie Canal, New York became the greatest boomtown the world has ever known. The population of New York had been increasing by about 30,000 every decade since 1790, with 123,000 inhabitants in 1820. By 1830, however, New York's population had reached 202,000; by 1840, 313,000. It was 516,000 in 1850 and 814,000 in 1860. Development roared up Manhattan Island, at the astonishing rate of about two blocks a year.

Thanks to the Erie Canal, by the 1840s New York's financial market was the largest in the country. In that decade the telegraph began to spread quickly, allowing more and more people to trade in the New York market, which has dominated American financial activity ever since.

Even so, perhaps the greatest consequence of the Erie Canal was that its success made the country far more receptive to other projects of unprecedented scale and scope and encouraged its entrepreneurs and politicians to think big. The result was a still-continuing string of megaprojects—the Atlantic cable, the Brooklyn Bridge, the Panama Canal, Hoover Dam, the interstate highway system, the Apollo missions—that have marked the economic history of the United States and shaped the national character.

11. In the second and third paragraphs (lines 9–21), the primary contrast is between:

A. the Industrial Revolution in England and in the United States.
B. England's geographical suitability for canal building and the early United States'.
C. the English public's attitude toward canals and the U.S. public's.
D. canals built before and after the Industrial Revolution.

GO ON TO THE NEXT PAGE.

12. The reference to Jefferson most directly supports which of the following points made in the passage?

F. Until Clinton made it happen, a canal like the Erie had seemed nearly impossible.
G. Early U.S. presidents looked to England for guidance on how to improve the economy.
H. The federal government should have covered the expense of building the Erie Canal.
J. It took a U.S. president's influence to overcome opposition to building the Erie Canal.

13. Based on the passage, what effect, if any, did the building of the Erie Canal have on the size of the population of New York City?

A. The canal had virtually no direct effect on the city's population, which was growing at the same pace as that of other major U.S. cities.
B. The canal caused a significant population increase that continued until at least 1860.
C. The canal resulted in the population stabilizing after many years of decline due to westward migration.
D. The canal caused a population decline, as it provided an affordable way to leave the city.

14. The author speculates that perhaps the greatest consequence of the Erie Canal was the way it:

F. inspired other nations to build canal systems and thereby improve their economies.
G. brought about the start of the Industrial Revolution in the United States.
H. encouraged people in the United States to envision a wide range of monumental projects.
J. allowed goods produced in previously isolated parts of the United States to reach large markets.

15. According to the passage, the kind of crops that were transported on the Erie Canal had, prior to the canal's existence, been transported from:

A. Maine to Alabama east of the mountains connecting the two states.
B. the Hudson River to the Great Lakes.
C. New York City to Albany.
D. west of the Appalachian Mountains to the south on the Mississippi River.

16. The passage portrays Clinton as:

F. an outsider to New York politics who achieved prominence through the sheer force of intelligence and hard work.
G. an outsider to New York politics who was never fully embraced by the state in spite of his contributions to its well-being.
H. an established politician who had to overcome the stigma of relatives who were failures as elected officials.
J. a member of a prominent New York family with ties to politics who presided over a transformational time in the state's history.

17. The passage states that the New York state legislature's attitude toward Clinton's plans to build the Erie Canal was one of:

A. indifference.
B. reluctance.
C. unrealistic enthusiasm.
D. well-reasoned support.

18. It is reasonable to infer from the passage that each of the canals in England was:

F. shorter than 363 miles.
G. longer than 500 miles.
H. a brainstorm of the national government.
J. off-limits to private businesses.

19. According to the passage, one source of funds for the building of the Erie Canal was:

A. President Madison's personal assets.
B. fees collected from states west of the Mississippi River that wanted access to the completed canal.
C. revenues from commerce on the completed parts of the canal.
D. revenues from other large-scale projects in operation, such as the Panama Canal.

20. In the context of the passage, lines 58–61 primarily serve to:

F. compare the value of $120 today with the value of $120 in Clinton's time.
G. contradict what Clinton had predicted would be the cost of operating the Erie Canal.
H. support the point that the Erie Canal was primarily a route to transport foodstuffs.
J. illustrate why the Erie Canal was so heavily used.

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Passage III

HUMANITIES: This passage is adapted from *The Professor and the Madman* by Simon Winchester (©1998 by Simon Winchester).

The "English dictionary," in the sense that we commonly use the phrase today, is a relatively new invention. Four hundred years ago there was no such convenience available on any English bookshelf.

There was none available, for instance, when William Shakespeare was writing his plays. Whenever he came to use an unusual word, or to set a word in what seemed an unusual context—and his plays are extraordinarily rich with examples—he had almost no way of checking the propriety of what he was about to do. He could not, as the saying goes, "look something up." Indeed, the very phrase—when it is used in the sense of "searching for something in a dictionary or encyclopedia or other book of reference"—simply did not exist. It does not appear in the English language, in fact, until as late as 1692, when an Oxford historian named Anthony Wood used it.

One might think Shakespeare would want to look things up all the time. "Am not I consanguineous?" he writes in *Twelfth Night.* A few lines on he talks of "thy doublet of changeable taffeta." He then declares: "Now is the woodcock near the gin." Shakespeare's vocabulary was evidently prodigious: But how could he be certain that in all the cases where he employed unfamiliar words, he was grammatically and factually right?

At the time he was writing there were atlases aplenty, there were prayer books, missals, histories, biographies, romances, and books of science and art. Shakespeare is thought to have drawn many of his classical allusions from a specialized *Thesaurus* that had been compiled by a man named Thomas Cooper—its many errors are replicated far too exactly in the plays for it to be coincidence—and he is thought also to have drawn from Thomas Wilson's *Arte of Rhetorique.* It is perhaps difficult to imagine so creative a mind working without a single work of lexicographical reference beside him, other than Mr. Cooper's crib (which Mrs. Cooper once threw into the fire, prompting the great man to begin all over again) and Mr. Wilson's little manual, but that was the condition under which his particular genius was compelled to flourish. The English language was spoken and written—but at the time of Shakespeare it was not defined, not *fixed.* It was like the air—it was taken for granted, the medium that enveloped and defined all Britons. But as to exactly what it was, what its components were—who knew?

That is not to say there were no dictionaries at all. There had been a collection of Latin words published as a *Dictionarius* as early as 1225, and a little more than a century later another, also Latin-only, as a helpmeet for students of Saint Jerome's difficult translation of the Scriptures known as the Vulgate. In 1538 the first of a series of Latin-English dictionaries appeared in London—Thomas Elyot's alphabetically arranged list, which happened to be the first book to employ the English word *dictionary* in its title. Twenty years later a man named Withals put out *A Shorte Dictionarie for Yonge Beginners* in both languages, but with words arranged not alphabetically, but by subject, such as "the names of the Byrdes, Byrdes of the Water, Byrdes about the house, as cockes, hennes, etc., of Bees, Flies, and others."

But what was still lacking was a proper English dictionary, a full statement of the extent of the English tongue. With one single exception, of which Shakespeare probably did not know when he died in 1616, this need remained stubbornly unfulfilled. Others were to remark on the apparent lack as well. In the very same year as Shakespeare's death, his friend John Webster wrote his play *The Duchess of Malfi*, incorporating a scene in which the duchess's brother Ferdinand imagines that he is turning into a wolf, "a pestilent disease they call licanthropia." "What is that?" cries one of the cast. "I need a dictionary to't!"

But in fact someone, a Rutland schoolmaster named Robert Cawdrey, who later moved to teach in Coventry, had evidently been listening to this drumbeat of demand. He read and took copious notes from all the reference books of the day and eventually produced his first halfhearted attempt at what was wanted by publishing such a list in 1604. It was a small octavo book of 120 pages, which Cawdrey titled *A Table Alphabeticall . . . of hard unusual English Words.* It had about 2,500 word entries. It had many shortcomings; but it was without doubt the very first true monolingual English dictionary, and its publication remains a pivotal moment in the history of English lexicography.

21. The main purpose of the passage is to:

A. identify the linguistic references Shakespeare drew on while writing his plays.
B. trace in chronological order the key events and works in the history of the English dictionary.
C. discuss the development of the English dictionary and the need that prompted such a book.
D. show how playwrights were hurt by the slow evolution of the English dictionary.

22. The passage's author uses quotations from Shakespeare mainly to help make the point that Shakespeare:

F. intentionally misused some obscure words and phrases in his plays.
G. avoided consulting dictionaries for fear of stifling his creativity.
H. saved his most innovative and memorable expressions for *Twelfth Night.*
J. had few language references available to guide how he used words in his plays.

GO ON TO THE NEXT PAGE.

23. It can reasonably be inferred that in terms of the main topic under discussion, the passage's author views which of the following works as the most important?

A. The *Dictionarius* published in 1225
B. Wilson's *Arte of Rhetorique*
C. Withals's *A Shorte Dictionarie for Yonge Beginners*
D. Cawdrey's *A Table Alphabeticall . . . of hard unusual English Words*

24. According to the passage's author, who first used the phrase *look something up* in the sense of consulting a reference work?

F. Shakespeare
G. Wood
H. Webster
J. Cooper

25. To support his assertion about Shakespeare's use of Cooper's *Thesaurus*, the passage's author points to:

A. evidence from Shakespeare's plays.
B. Shakespeare's own admission.
C. scholarly articles.
D. Wilson's *Arte of Rhetorique*.

26. The passage quotes dialogue from the play *The Duchess of Malfi* primarily to:

F. point out that Webster and Shakespeare were friends.
G. indicate that some people in the early 1600s recognized the need for an English dictionary.
H. claim that the word *licanthropia* lacked an adequate definition in Shakespeare's time.
J. document Webster's role in expanding the English language through his plays.

27. The passage's author most likely intends the question in lines 45–46 to be read in what manner?

A. Rhetorically; he asks the question for effect and doesn't expect anyone to answer it.
B. Genuinely; he hopes to learn the components of the English language in Shakespeare's day.
C. Critically; he's scolding Shakespeare scholars for not knowing the answer to the question.
D. Ironically; he believes people of Shakespeare's day knew precisely what the English language was.

28. The passage makes clear that one purpose of the early Latin-only word collections was as an aid to the study of:

F. religious writings.
G. natural science.
H. agriculture.
J. plays.

29. According to the passage, all of the following are true about Elyot's word list EXCEPT that it:

A. debuted in London in 1538.
B. was the first of a series of Latin-English dictionaries.
C. was the first to use the English word *dictionary* in its title.
D. was organized by subject rather than alphabetically.

30. The primary purpose of the words in quotation marks in lines 59–62 is to:

F. indicate that the focus of Withals's dictionary was on waterfowl and domesticated birds.
G. provide examples of the categories Withals used to organize his dictionary.
H. prove that Withals's dictionary was inspired by Elyot's earlier work.
J. suggest that Withals's dictionary was too advanced for "young beginners."

Passage IV

NATURAL SCIENCE: This passage is adapted from the article "Prairie Islands" by Sam Hooper Samuels (©2005 by the Sierra Club).

It's a fine day for a prairie fire. Wind is steady at 10 to 15 miles per hour from the southeast, and the humidity hovers around 50 percent. For early August in Iowa the weather is cool and won't overheat the crew. Kevin Pape, a ranger for Stone State Park, attired in a flame-resistant suit and broad-brimmed fire hat, exudes quiet confidence as he passes among the workers. He's handing out aerial photographs marked with letters and boundary lines of the next unit to be burned.

Pape and his crew are preserving prairie in the Loess Hills of Iowa by torching it.

These are some of Iowa's last and most ecologically diverse prairies, and they're disappearing like drops of water on a hot skillet. Of the vast prairie that once blanketed the Hawkeye State, less than one-tenth of one percent survives. Of that tiny remnant, more than half is here in the Loess Hills, a long band of steep peaks, some jutting up to 400 feet, hugging the Missouri River valley along the western edge of the state. The hills are Iowa's secret treasure, a 650,000-acre miniature mountain range that punctuates the famous flatness of the Midwest with sharp slopes and cool, sheltering hollows.

The hills were blown in, particle by particle, on the winds. The Loess Hills get their name from the dirt they're made of. It's a German word, *Löss*. It rhymes with "fuss" and means dust, literally "loose." Loess is fine yellowish mineral stuff, rock pulverized by glaciers over the 150 millennia of the last ice age and carried south by rivers. When the rivers dried, they left tons of this siltlike powder to be picked up by winds and scattered across the heartland.

Under the rich topsoil of its green croplands, most of Iowa is covered in a 50-foot-deep blanket of loess. Only here, though, where the winds from the west met the Missouri's eastern shore, was the loess dumped in great heaps. The only other landform like it is along the banks of China's Yellow River, named for its loess-clouded waters.

Fragile Giants is what scientific historian Cornelia Mutel titled her 1989 book, the best natural history yet of the hills. Fragile indeed. Where the loess is exposed, you can break it off in chunks and crumble it to a powder that disappears almost before it hits the ground.

From the ground, the topography calls to mind the intricate, pleated patterns of sand dunes. Long, meandering ridges are like spines with rows of smaller ridges projecting out like ribs, and even smaller spur ridges projecting from these in turn. Natural terraces follow the hills' contours because of the mineral soil's peculiar inclination to compact into straight vertical walls. These "catsteps"—unmistakable signatures of loess terrain—create a complex network of ridges, a hiker's dream of hilltop mazes with nonstop prairie vistas.

Most of Iowa's prairie long ago fell victim to the plow or the pavement. But because the Loess Hills are often too steep for row crops, pockets of high-quality virgin prairie remain. Big bluestem, little bluestem, sideoats grama, prairie clovers, lead plant, and dozens of other grasses, sedges, and flowering plants mottle the hills.

When Lewis and Clark passed within a few miles of this spot 200 years ago, it was largely a treeless landscape. Back then, fire would scorch any given patch of prairie every four to seven years. In autumn, the dry plants could fuel towering flames and intense heat. These conflagrations could advance faster than a person on horseback could flee, but they were as vital to the survival of a prairie as water itself. Prairie plants evolved root systems up to 15 feet deep to survive the flames.

To bring fire back, Pape and his crew are part of a network of prescribed-burn fire-setters called the Stewardship Committee. Of the hills' 650,000 acres, only about 18,000—a patchwork of state, county, and privately owned parklands—are under any sort of conservation management. The committee does its best to burn those areas as regularly as nature once did. It's a sort of latter-day ecological posse, a band of professionals trained in fire management that convenes whenever and wherever conditions are right to incinerate bad guys like overgrown sumac, dogwood, eastern red cedar, and the invasive Siberian elm.

It takes less than an hour for the committee to transform the patch of lush prairie into a smoking black blanket. All around, the scorched skeletons of hundreds of young sumac trees stand, still vertical but ready to disintegrate into ashes. In a few weeks, this area will be green again.

31. The main idea of the passage is that:

A. the Loess Hills need more environmental protection to ensure that they aren't converted to farmland.
B. fire-setters are cautious when determining if conditions are ideal for a prairie fire in the Loess Hills.
C. the Loess Hills contain rare prairies, a portion of which are preserved with some human intervention.
D. Iowa contains some of the nation's most ecologically diverse prairies.

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32. The passage does NOT identify which of the following as a feature of the Loess Hills?

F. Pleated patterns akin to those of sand dunes
G. Loess-clouded waters
H. A complex network of ridges
J. Dozens of types of grasses

33. In the context of the passage, the phrase "as regularly as nature once did" (line 78) most strongly suggests that fire-setters aim to conduct prescribed burns for any given area of prairie approximately:

A. once a year.
B. every four to seven years.
C. every decade or two.
D. every two hundred years.

34. The passage most strongly implies that the root systems of prairie plants differ from those of plants such as sumac and the Siberian elm in that the root systems of prairie plants:

F. are deep enough to help the plants recover from fires.
G. can help eliminate invasive plants.
H. can propagate the plant when seeding conditions are poor.
J. survive in loess and sandy soil.

35. The details describing Pape in lines 5–9 are most likely included to:

A. explain why Pape appreciates his occupation as a ranger.
B. demonstrate that natural prairie fires sometimes are difficult to control.
C. suggest that Pape is experienced in setting and managing prescribed prairie burns.
D. show that human presence on the Loess Hills is environmentally hazardous.

36. The statement in lines 10–11 can best be described as a:

F. claim that seems contradictory until the passage makes clear that setting fire to the prairie is beneficial to its survival.
G. metaphor that likens Pape and his crew to a torch in order to illustrate how they will destroy the prairie.
H. sarcastic remark that makes clear that the passage's author is critical of Pape's methods.
J. claim that the passage's author seems to agree with but then goes on to refute.

37. As it is used in line 21, the word *punctuates* most nearly means:

A. scatters.
B. questions.
C. indicates.
D. interrupts.

38. The main idea of the eighth paragraph (lines 55–61) is that:

F. big bluestem, little bluestem, and other flowering plants are invasive species that dominate the Loess Hills.
G. the Loess Hills, like most of Iowa's prairie, were destroyed long ago by farming and urban development.
H. Iowa's fertile topsoil is perfect for farmers to plant steep rows of grasses, sedges, and flowering plants.
J. because they are often too steep for farming, the Loess Hills have preserved pockets of virgin prairie.

39. The passage implies that natural prairie fires previously burned the highest and fastest during which season?

A. Spring
B. Summer
C. Autumn
D. Winter

40. According to the passage, compared to a prairie's need for water, a prairie's need for fire is:

F. greater.
G. equal.
H. slightly less.
J. significantly less.

END OF TEST 3

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

DO NOT RETURN TO A PREVIOUS TEST.

SCIENCE TEST

35 Minutes—40 Questions

DIRECTIONS: There are seven passages in this test. Each passage is followed by several questions. After reading a passage, choose the best answer to each question and fill in the corresponding oval on your answer document. You may refer to the passages as often as necessary.

You are NOT permitted to use a calculator on this test.

Passage I

A scientist discovered that cells of a new strain of bacteria, Bacteria X, form colonies when incubated for 72 hr at 37°C on a growth medium having a pH of 7 and an NaCl concentration of 5 g/L. To determine whether these conditions are optimal for the growth of Bacteria X, the scientist conducted an experiment in which incubation temperature, and the pH and the NaCl concentration of the growth medium, were varied. In each trial, Bacteria X cells were incubated for 72 hr, and colony growth was then assayed by determining the average colony diameter (ACD) of the colonies that grew during the incubation (see the table).

		Growth medium:		
Trial	Incubation temperature (°C)	pH	NaCl concentration (g/L)	ACD (mm)
1	25	6	5	1.1
2	37	6	5	1.7
3	42	6	5	0.8
4	25	6	10	1.3
5	37	6	10	1.9
6	42	6	10	0.9
7	25	7	5	1.1
8	37	7	5	1.5
9	42	7	5	1.0
10	25	7	10	1.2
11	37	7	10	2.1
12	42	7	10	1.1

1. To determine whether doubling the NaCl concentration in the growth medium doubles the ACD of Bacteria X, the scientist should compare the results of which of the following 2 trials?
   - **A.** Trial 2 and Trial 3
   - **B.** Trial 2 and Trial 5
   - **C.** Trial 4 and Trial 6
   - **D.** Trial 7 and Trial 8

2. How did increasing the pH of the growth medium from pH 6 to pH 7 affect the ACD when Bacteria X cells were incubated at 42°C on a growth medium having an NaCl concentration of 5 g/L ? When the pH was increased from pH 6 to pH 7, the ACD:
   - **F.** increased; the ACD for Trial 1 was 1.1 mm and the ACD for Trial 2 was 1.7 mm.
   - **G.** increased; the ACD for Trial 3 was 0.8 mm and the ACD for Trial 9 was 1.0 mm.
   - **H.** decreased; the ACD for Trial 1 was 1.7 mm and the ACD for Trial 2 was 1.1 mm.
   - **J.** decreased; the ACD for Trial 3 was 1.0 mm and the ACD for Trial 9 was 0.8 mm.

3. Which of the growth conditions was(were) varied among Trials 10–12 ?
   - **A.** Temperature only
   - **B.** pH only
   - **C.** Temperature and pH only
   - **D.** pH and NaCl concentration only

4. The scientist predicted that the ACD for Bacteria X colonies would be greatest when the bacteria were incubated at a temperature of 37°C on a growth medium having a pH of 7 and an NaCl concentration of 5 g/L. Are the results in the table consistent with this prediction?
   - **F.** Yes; the ACD for Bacteria X colonies was greatest in Trial 8.
   - **G.** Yes; the ACD for Bacteria X colonies was greatest in Trial 11.
   - **H.** No; the ACD for Bacteria X colonies was greatest in Trial 8.
   - **J.** No; the ACD for Bacteria X colonies was greatest in Trial 11.

5. The growth mediums tested in Trial 4 and Trial 10 differed in which of the following ways?
   - **A.** The growth medium in Trial 4 was more acidic than the growth medium in Trial 10.
   - **B.** The growth medium in Trial 10 was more acidic than the growth medium in Trial 4.
   - **C.** The NaCl concentration of the growth medium was greater in Trial 4 than in Trial 10.
   - **D.** The NaCl concentration of the growth medium was greater in Trial 10 than in Trial 4.

Passage II

When a sphere falls through air, the sphere is subjected to a drag force, F, that resists its motion. F depends on the sphere's diameter, D; the air temperature, T; the sphere's speed, V; and atmospheric pressure.

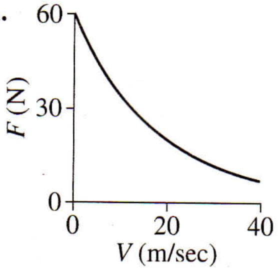
The table below gives F, in newtons (N), on a sphere falling through air near Earth's surface, for various combinations of D, in meters (m); T, in degrees Celsius (°C); and V, in meters per second (m/sec). For each combination, air pressure is 1 atmosphere.

Combination	D (m)	T (°C)	V (m/sec)	F (N)
1	0.050	25.0	20.0	0.93
2	0.100	25.0	20.0	3.71
3	0.150	25.0	20.0	8.34
4	0.200	25.0	20.0	14.9
5	0.200	10.0	20.0	15.8
6	0.200	15.0	20.0	15.5
7	0.200	20.0	20.0	15.1
8	0.200	25.0	20.0	14.9
9	0.200	25.0	10.0	3.72
10	0.200	25.0	20.0	14.9
11	0.200	25.0	30.0	33.5
12	0.200	25.0	40.0	59.5

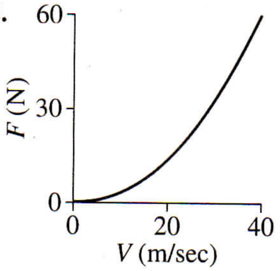
6. According to Combinations 5–8, as T increases, F:
   - **F.** increases only.
   - **G.** decreases only.
   - **H.** varies, but with no general trend.
   - **J.** remains the same.

7. Based on Combinations 9–12, the relationship between F and V is best represented by which of the following graphs?

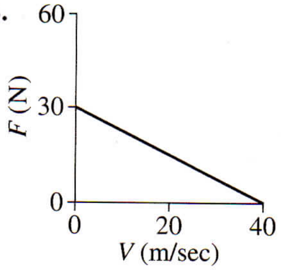
A.



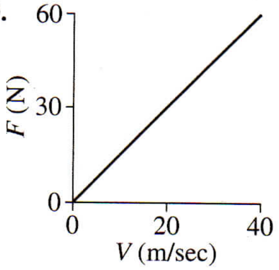
C.



B.



D.



8. Based on the table, F will be greatest for which of the following D, T, and V?

	D (m)	T (°C)	V (m/sec)
F.	0.400	30	100
G.	0.400	60	200
H.	0.800	60	100
J.	0.800	30	200

9. If experimental trials were conducted in which Combinations 1–4 were tested, what would be the independent variable and what would be the dependent variable?

	independent	dependent
A.	V	T
B.	T	V
C.	F	D
D.	D	F

10. As a sphere moves as described in the passage, a transformation of energy takes place involving the sphere's kinetic energy (KE_S), the sphere's potential energy due to Earth's gravity (GPE_S), and heat (Q). Which of the following statements best describes this transformation?
    - **F.** Both GPE_S and Q are converted to KE_S.
    - **G.** Both KE_S and Q are converted to GPE_S.
    - **H.** GPE_S is converted to KE_S and Q.
    - **J.** Q is converted to GPE_S and KE_S.

Passage III

When *t*-butyl chloride [$(CH_3)_3CCl$] is dissolved in an acetone-H_2O solution, it reacts with H_2O completely to form *t*-butyl alcohol [$(CH_3)_3COH$]:

$$(CH_3)_3CCl + H_2O \xrightarrow[\text{acetone-}H_2O]{} (CH_3)_3COH + H^+ + Cl^-$$

Acetone is less polar than H_2O. Thus, increasing the concentration of acetone in H_2O *decreases* the polarity of the reaction solution.

Figures 1 and 2 show how the electrical conductivity of each of 5 acetone-H_2O solutions varied over time after 1 mg of $(CH_3)_3CCl$ was dissolved in 100 mL of each solution. The conductivity (which increased as the solution's ion concentration increased) stopped increasing when the reaction had run to completion (indicated by the point labeled "RC").

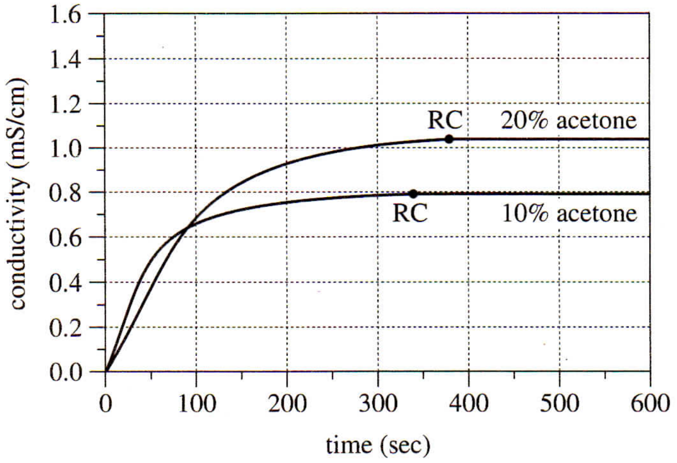
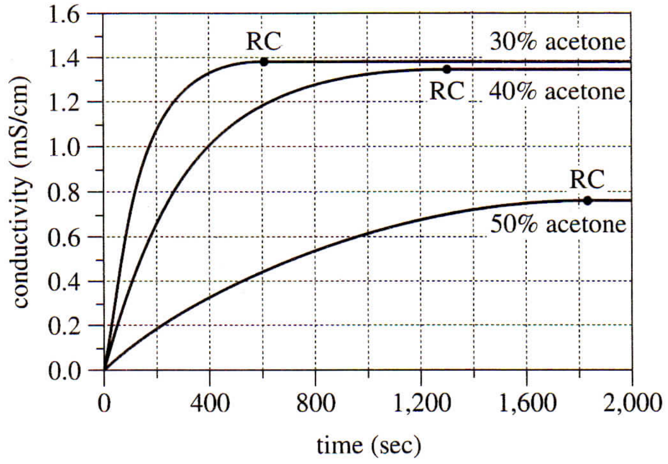


Figure 1



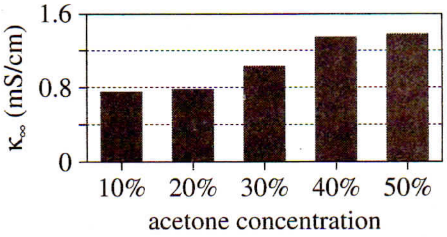
Note: In Figures 1 and 2, concentration is given as the percent by mass of acetone in the solution, and conductivity is given as millisiemens per centimeter, mS/cm.

Figure 2

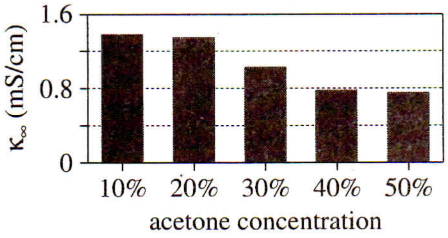
Figures adapted from Peter Keusch, "Kinetics: Hydrolysis of Tertiary Butyl Halides – First Order Reaction." ©2000 by Universität Regensburg.

11. The conductivity of the reaction solution at the end of a reaction is κ_∞. Which of the following graphs best shows how κ_∞ varied with acetone concentration?

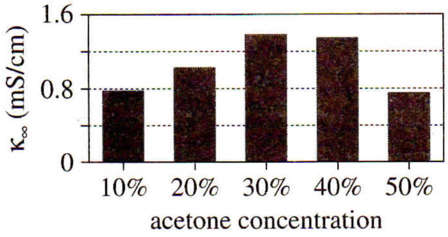
A.



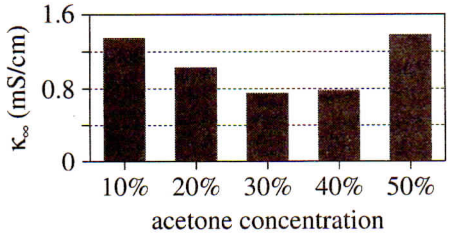
B.



C.



D.



12. Based on Figure 2, if a 45% acetone solution had been tested, the reaction would most likely have reached completion at a time:

F. less than 600 sec.
G. between 600 sec and 1,200 sec.
H. between 1,200 sec and 1,800 sec.
J. greater than 1,800 sec.

13. Based on Figures 1 and 2, the reaction was completed soonest when the acetone concentration was:

A. 10%.
B. 20%.
C. 40%.
D. 50%.

14. Consider the acetone-H_2O solution that resulted in the greatest maximum conductivity shown in Figures 1 and 2. What masses of acetone and H_2O can be mixed together to make 100 g of this solution?

	acetone	H_2O
F.	20 g	80 g
G.	20 g	100 g
H.	30 g	70 g
J.	30 g	100 g

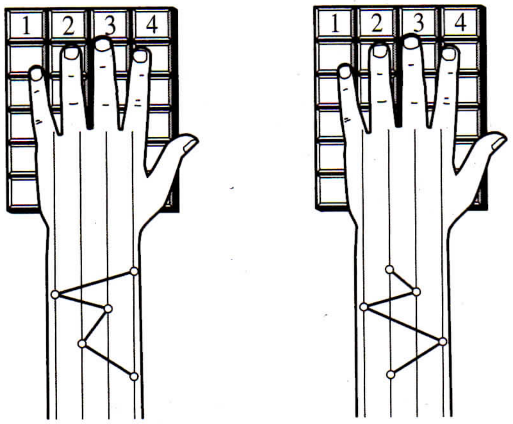
15. As *resistivity* increases, the ability to conduct electricity *decreases*. Based on Figures 1 and 2, which of the solutions had the highest resistivity at RC ?

A. 20% acetone
B. 30% acetone
C. 40% acetone
D. 50% acetone

Passage IV

Scientists investigated whether sleep improves *procedural memory* (memory of skilled movements).

Subjects trained to tap their fingers in 1 or 2 sequences: Sequence X only, or Sequence X followed by Sequence Y (see Figure 1). To train for a sequence, the subjects attempted to tap the sequence for 30 sec and then rested for 30 sec, 12 times in succession. During the last 3 of these 12 cycles, the subjects' accuracy was tested.



Seq X:
"4-1-3-2-4"

Seq Y:
"2-3-1-4-2"

Figure 1

The subjects' accuracy was *retested*—either immediately after training or after a full night's sleep—as they attempted to tap the sequence during 3 cycles.

Six groups, each consisting of 15 people, were subjected to different protocols:

Group 1 trained for Seq X and was immediately retested.

Group 2 trained for Seq X, slept overnight, and was retested the next day.

Group 3 trained for Seq X, immediately trained for Seq Y, and was immediately retested.

Group 4 trained for Seq X, immediately trained for Seq Y, slept overnight, and was retested the next day.

Group 5 trained for Seq X, waited for 6 hr, trained for Seq Y, slept overnight, and was retested the next day.

Group 6 trained for Seq X, waited for 9 hr, trained for Seq Y, slept overnight, and was retested the next day.

The table shows, for each group, the percent change in the average accuracy of the subjects between their initial testing (during training) and their retesting.

Table 1

Group	Sequences taught	Time between training sessions (hr)	Sleep before retesting	Percent change in average accuracy for Sequence:	
				X	Y
1	X only	n.a.	no	−4	n.a.
2	X only	n.a.	yes	25	n.a.
3	X and Y	0	no	−9	−10
4	X and Y	0	yes	−1	42
5	X and Y	6	yes	23	40
6	X and Y	9	yes	25	40

Note: n.a. indicates that the conditions are not applicable.

Figure 1 and Table 1 adapted from Matthew P. Walker et al., "Dissociable Stages of Human Memory Consolidation and Reconsolidation." ©2003 by Nature Publishing Group.

16. When subjects were *not* trained for Seq Y, did retesting after a full night's sleep result in an increase in the percent change in average accuracy for Seq X ?

- **F.** Yes; the percent change in average accuracy for Group 2 was 25%, compared to −4% for Group 1.
- **G.** Yes; the percent change in average accuracy for Group 3 was −9%, compared to −4% for Group 1.
- **H.** No; the percent change in average accuracy for Group 2 was 25%, compared to −4% for Group 1.
- **J.** No; the percent change in average accuracy for Group 3 was −9%, compared to −4% for Group 1.

17. To consider whether Seq Y was finger-tapped with greater accuracy after a full night's sleep than it was immediately after training, one should compare the results for:

- **A.** Groups 1 and 2.
- **B.** Groups 2 and 3.
- **C.** Groups 3 and 4.
- **D.** Groups 4 and 5.

18. The results of the study are most consistent with which of the following conclusions about the effect of sleep on procedural memory?

F. Sleep before learning can improve procedural memory.
G. Sleep after learning can improve procedural memory.
H. Sleep before learning cannot improve procedural memory.
J. Sleep after learning cannot improve procedural memory.

19. How did the behavior of a subject training for Seq X differ from the behavior of a subject training for Seq Y ? A subject training for Seq X finger-tapped:

A. for 30 sec intervals, whereas a subject training for Seq Y finger-tapped for 1 min intervals.
B. with the right hand, whereas a subject training for Seq Y finger-tapped with the left hand.
C. for a total of 12 intervals, whereas a subject training for Seq Y finger-tapped for a total of 3 intervals.
D. 4-1-3-2-4, whereas a subject training for Seq Y finger-tapped 2-3-1-4-2.

20. Based on the results in the table, when subjects in Group 3 were retested, was their average accuracy for finger-tapping Seq X less than or greater than that during training?

F. Less, because the percent change in average accuracy was less than 0.
G. Less, because the percent change in average accuracy was greater than 0.
H. Greater, because the percent change in average accuracy was less than 0.
J. Greater, because the percent change in average accuracy was greater than 0.

21. One of the scientists predicted that increasing the time between training for Seq X and training for Seq Y from 0 hr to 6 hr would have no effect on the percent change in average accuracy for Seq X. Was the scientist's prediction correct?

A. Yes; the percent change in average accuracy for Seq X was the same for Group 4 as it was for Group 3.
B. Yes; the percent change in average accuracy for Seq X was the same for Group 5 as it was for Group 4.
C. No; the percent change in average accuracy for Seq X was greater for Group 4 than it was for Group 3.
D. No; the percent change in average accuracy for Seq X was greater for Group 5 than it was for Group 4.

Passage V

Gas-giant planets have a solid core surrounded by a massive envelope of gases. Gas-giant planets form within *stellar nebulae*—large, flattened clouds of gas and dust that surround newly formed stars. Planet formation begins when some of the solid material within a stellar nebula clumps together to form a spherical body called a *planet core*. Two scientists discuss how gas-giant planets like Jupiter form from planet cores in stellar nebulae.

Scientist 1

A planet core continuously attracts additional solid particles from the stellar nebula, gradually increasing its mass. If a planet core reaches a minimum mass of 10 times the mass of Earth (10 M_E), its gravity is then strong enough to attract and hold gases from the surrounding stellar nebula. The formation of a 10 M_E planet core takes approximately 1 million years. The time required for a 10 M_E planet core to then attract a minimum 300 M_E of gases and thus become a gas-giant planet like Jupiter is 10 million to 100 million years more. Because it takes so long to form gas-giant planets like Jupiter, they are very rare in our galaxy.

Scientist 2

Gas-giant planets form in a stellar nebula if gravity variations cause the nebula to suddenly fragment into 2 or more massive spherical clumps of gas and dust called *gas-giant protoplanets* (GGPP), each having a planet core at the center that is no larger than 6 M_E. A GGPP forms in less than 1,000 years. After formation, the GGPP contracts to form a gas-giant planet. The entire process from the start of GGPP formation to a new gas-giant planet takes only about 1 million years.

Gas-giant planets like Jupiter would not have time to form as described by Scientist 1. Observations indicate that stellar nebulae around newly formed stars do not remain in existence longer than 7 million years after the stars are formed. Also, planet cores that are not part of a GGPP do not have enough momentum to keep them from spiraling into the star at the center of the nebula within 100,000 years. Gas-giant planets like Jupiter are not rare. At least 130 gas-giant planets as large as or larger than Jupiter have been identified in our galaxy.

22. What are the 2 scientists' estimates of the mass of a planet core that later becomes the center of a gas-giant planet?

	Scientist 1	Scientist 2
F.	exactly 10 M_E	exactly 6 M_E
G.	exactly 6 M_E	exactly 10 M_E
H.	at least 10 M_E	at most 6 M_E
J.	at least 6 M_E	at most 10 M_E

23. Based on Scientist 1's discussion, which of the following statements gives the most likely reason Earth is not a gas-giant planet? At the time the planets were forming in the Sun's stellar nebula, the:

A. planet core that became Earth was not massive enough to attract and hold a sufficient amount of gases.
B. planet core that became Earth was massive enough to attract and hold a large quantity of gases.
C. nebula did not contain enough gases to form any gas-giant planets.
D. nebula contained only enough gases to form 2 gas-giant planets.

24. The discovery that some stellar nebulae remain in existence for more than 10 million years would *contradict* a statement made by:

F. Scientist 1 only.
G. Scientist 2 only.
H. both Scientist 1 and Scientist 2.
J. neither Scientist 1 nor Scientist 2.

25. Suppose a planet core in a stellar nebula has, over time, attracted and held 200 M_E of gases from the nebula. Would Scientist 1 be likely to claim that this planet core surrounded by 200 M_E of gases is a gas-giant planet like Jupiter?

A. Yes, because Scientist 1 claims that less than 200 M_E of gases must be attracted and held by a planet core to form such a gas-giant planet.
B. Yes, because Scientist 1 claims that no less than 200 M_E of gases must be attracted and held by a planet core to form such a gas-giant planet.
C. No, because Scientist 1 claims that more than 200 M_E of gases must be attracted and held by a planet core to form such a gas-giant planet.
D. No, because Scientist 1 claims that no more than 200 M_E of gases must be attracted and held by a planet core to form such a gas-giant planet.

26. The discovery of which of the following objects would provide the strongest support for Scientist 2's viewpoint?

F. Several 1-million-year-old stars, none with orbiting gas-giant planets
G. Several 1-million-year-old stars, each with 2 orbiting gas-giant planets
H. Several 100-million-year-old stars, none with orbiting gas-giant planets
J. Several 100-million-year-old stars, each with 2 orbiting gas-giant planets

27. Assume that the gas-giant planets and the non-gas-giant planets (*terrestrial planets*) in another solar system in our galaxy have spatial and size relationships the same as those of the gas-giant planets and the terrestrial planets in our solar system. Given this assumption, in the other solar system, an existing gas-giant planet would most likely be:

A. located at a greater distance from the star than would any of the terrestrial planets.
B. located at a lesser distance from the star than would any of the terrestrial planets.
C. the same diameter as the largest terrestrial planet.
D. a lesser diameter than any of the terrestrial planets.

28. Based on Scientist 2's discussion, in a stellar nebula, a 10 M_E planet core that was NOT part of a GGPP would most likely:

F. form a gas-giant planet in fewer than 10 million years.
G. escape from the central star's gravity and travel out into space.
H. continue to revolve around the central star at a constant distance and speed.
J. move in toward the central star and eventually be destroyed.

Passage VI

In a hydrothermal vent, *anaerobic oxidation of methane* (AOM) occurs in the top 20 cm of ocean-floor sediment (see Figure 1). This reaction begins when hot fluid containing methane (CH_4) rises from a source deep beneath the ocean-floor surface and mixes with seawater containing sulfate (SO_4^{2-}).

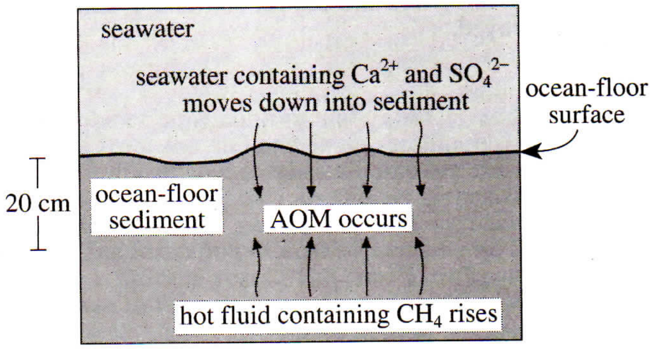

seawater
seawater containing Ca^{2+} and SO_4^{2-} moves down into sediment
ocean-floor surface
20 cm
ocean-floor sediment
AOM occurs
hot fluid containing CH_4 rises

Figure 1

AOM is represented by the following equation:

$$CH_4 + SO_4^{2-} \rightarrow HCO_3^- + HS^- + H_2O$$

One of the 3 direct products of this reaction, HCO_3^-, can then combine with calcium (Ca^{2+}) in the seawater in a second reaction to produce solid calcium carbonate ($CaCO_3$). This $CaCO_3$ exists as *calcite* crystals and/or *aragonite* crystals. Over time, the crystals fill in the pores in the sediment.

At each of 10 locations in a hydrothermal vent, 2 vertical cylindrical cores of the top 20 cm of ocean-floor sediment were collected.

Study 1

One of the 2 cores from each of the 10 locations was cut every 0.5 cm along its length. Each piece of core was squeezed to extract all of the *pore water* (water present in the sediment's pores). The 10 pore water samples from the pieces at the same depth interval in each core were combined and then analyzed for SO_4^{2-} and CH_4. The average SO_4^{2-} and CH_4 concentrations, in millimoles per liter (mmol/L), from 0 cm to 20 cm depth are shown in Figure 2.

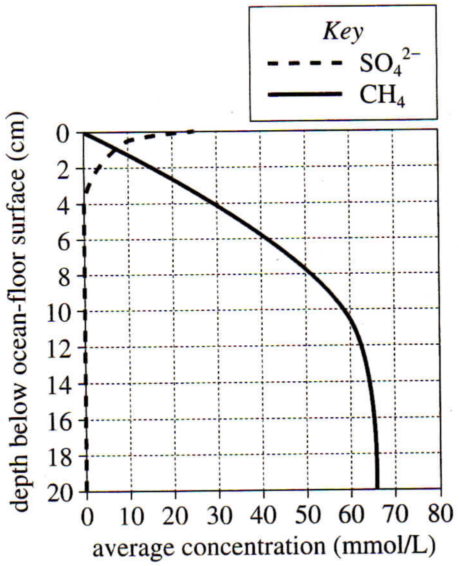


Figure 2

Study 2

The sediment in the other core from each of the 10 locations was sampled at the top of the core (0 cm depth), then every 0.5 cm along the core's length. The 10 samples from the same depth in each core were combined and then analyzed to determine the average percent by mass of calcite and the average percent by mass of aragonite in the sediment from 0 cm to 20 cm depth (see Figure 3).

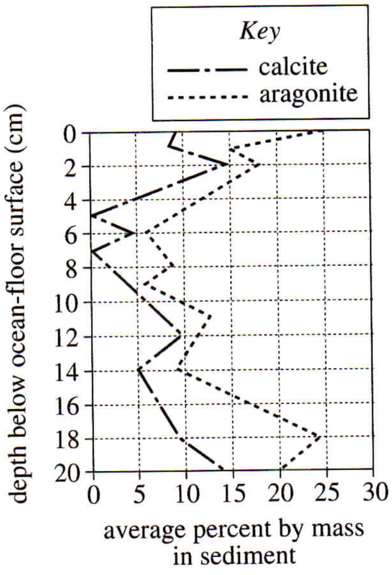


Figure 3

Figures 2 and 3 adapted from Roger Luff et al., "Simulation of Long-Term Feedbacks from Authigenic Carbonate Crust Formation at Cold Vent Sites." ©2004 by Elsevier B.V.

29. According to the results of Study 2, there was NO calcite found at which of the following depths?

A. 2 cm
B. 5 cm
C. 8 cm
D. 11 cm

30. Suppose that in Study 1, at the same locations, samples of ocean-floor sediment from 20 cm to 20.5 cm below the ocean-floor surface had been collected and combined. The pore water extracted from those combined samples would most likely have had an average SO_4^{2-} concentration and an average CH_4 concentration, respectively, closest to which of the following?

	SO_4^{2-} (mmol/L)	CH_4 (mmol/L)
F.	0	0
G.	0	65
H.	20	0
J.	20	65

31. Is the statement "Some SO_4^{2-} was found in the pore water from each depth interval in the cores" supported by Figure 2 ?

A. Yes, because Figure 2 indicates that the average SO_4^{2-} concentration was zero at depths of 4 cm or greater.
B. Yes, because Figure 2 indicates that the average SO_4^{2-} concentration was greater than zero at all depths.
C. No, because Figure 2 indicates that the average SO_4^{2-} concentration was zero at depths of 4 cm or greater.
D. No, because Figure 2 indicates that the average SO_4^{2-} concentration was greater than zero at all depths.

32. According to the results of Study 2, over the top 20 cm of sediment, how did the average percent by mass of calcite compare to the average percent by mass of aragonite? The average percent by mass of calcite was:

F. greater at each depth.
G. less at each depth.
H. greater at some depths but less at all other depths.
J. greater at some depths but the same at all other depths.

33. Consider the average percent by mass of aragonite at a depth of 10 cm shown in Figure 3. On average, the mass in grams of aragonite present in a 50 g sample of sediment taken from that depth would be closest to which of the following?

A. 2.5 g
B. 5 g
C. 25 g
D. 50 g

34. The procedures of Studies 1 and 2 differed in which of the following ways? In Study 1, samples were:

F. analyzed for the reactants of AOM, whereas in Study 2, samples were not analyzed for the reactants of AOM.
G. not analyzed for the reactants of AOM, whereas in Study 2, samples were analyzed for the reactants of AOM.
H. analyzed for the direct products of AOM, whereas in Study 2, samples were not analyzed for the direct products of AOM.
J. not analyzed for the direct products of AOM, whereas in Study 2, samples were analyzed for the direct products of AOM.

Passage VII

A physicist tested various sheets for their ability to stop *gamma rays* (γ-rays) that had different energies. Any γ-ray that was not stopped by a sheet struck a detector (see Figure 1), which then registered a detection, or *count*.

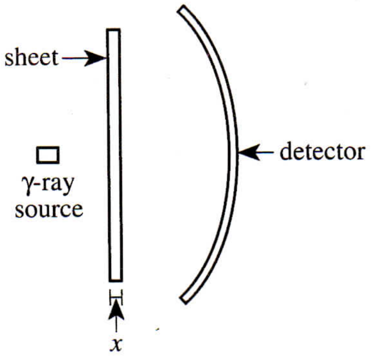


Figure 1

Each sheet was made of either Material 1, Material 2, or Material 3. The thickness, x, of each sheet was uniform, but sheets of the same material had different thicknesses.

I_0 represented the number of counts per minute (cpm) with no sheet between the γ-ray source and the detector, and I represented the cpm with 1 sheet between the source and the detector.

Experiment 1

First, the physicist measured I_0 for a source of γ-rays having an energy of 4 *million electron volts* (MeV). Next, with this same γ-ray source, she measured I for various sheets of Material 1, each having a different thickness x. Then, she plotted a graph of I versus x (in cm) for Material 1. Similarly, she produced graphs of I versus x for Material 2 and Material 3 (see Figure 2).

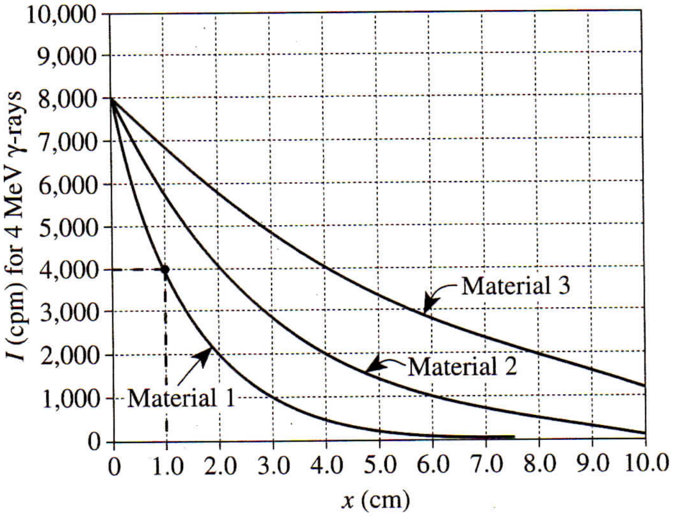


Figure 2

Experiment 2

The physicist repeated the procedures from Experiment 1 with other sources of γ-rays having different energies. For each combination of sheet material and γ-ray energy, she produced a graph of I versus x. These graphs are not shown.

From the graphs of I versus x, she found the *half-value thickness*, x_{half}, for each combination of sheet material and γ-ray energy. A sheet of thickness x_{half} stopped half of the γ-rays striking the sheet; that is, I equaled $\frac{I_0}{2}$. (For example, based on Figure 2, for 4 MeV γ-rays striking sheets of Material 1, x_{half} equaled 1.0 cm.) Finally, the physicist plotted a graph of x_{half} versus γ-ray energy for each material (see Figure 3).

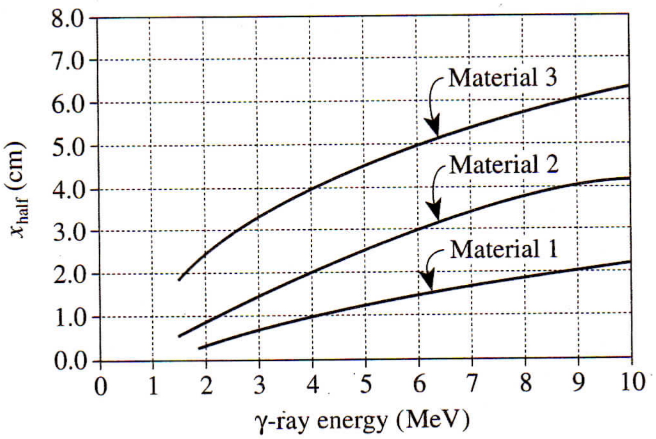


Figure 3

35. Based on the results of Experiment 2, for a given material, as γ-ray energy increased, x_{half}:

A. increased only.
B. decreased only.
C. varied, but with no general trend.
D. remained the same.

36. Based on the results of Experiment 1, x_{half} for Material 3 and a γ-ray energy of 4 MeV was closest to which of the following values?

F. 1.0 cm
G. 2.0 cm
H. 3.0 cm
J. 4.0 cm

37. Based on the results of Experiment 2, to stop a given number of γ-rays of a given energy, which sheet had to be thicker, a sheet made of Material 1 or a sheet made of Material 3 ?

A. Material 1, because at every energy plotted in Figure 3, x_{half} for Material 1 is greater than x_{half} for Material 3.
B. Material 1, because at every energy plotted in Figure 3, x_{half} for Material 1 is less than x_{half} for Material 3.
C. Material 3, because at every energy plotted in Figure 3, x_{half} for Material 3 is greater than x_{half} for Material 1.
D. Material 3, because at every energy plotted in Figure 3, x_{half} for Material 3 is less than x_{half} for Material 1.

38. Based on the description of the experiments, for γ-rays of a given energy, as the ability of materials to stop γ-rays increased, did I decrease or increase, and why?

F. Decrease, because the number of γ-rays reaching the detector per minute increased.
G. Decrease, because the number of γ-rays reaching the detector per minute decreased.
H. Increase, because the number of γ-rays reaching the detector per minute increased.
J. Increase, because the number of γ-rays reaching the detector per minute decreased.

39. The physicist must prepare a sheet that will yield a detection rate of 1,000 cpm when the sheet is struck by 4 MeV γ-rays, as in Experiment 1. This sheet can be no thicker than 10.0 cm. Based on the results of Experiment 1, the physicist can satisfy these requirements by constructing the sheet out of which of the materials tested?

A. Either Material 1 or Material 2
B. Either Material 1 or Material 3
C. Either Material 2 or Material 3
D. Either Material 1, Material 2, or Material 3

40. In Experiment 1, what was the value of I_0 ?

F. 0 cpm
G. 1 cpm
H. 4,000 cpm
J. 8,000 cpm

END OF TEST 4

STOP! DO NOT RETURN TO ANY OTHER TEST.

Form 17K
ACT Writing Test Prompt
(June 2012)

Many school districts have banned students from wearing articles of clothing, such as T-shirts, that have statements about social or political issues printed on them. Some school administrators support such a ban because they think students should be restricted from wearing clothes with statements that might offend other students and disrupt the educational process. Other school administrators do not support such a ban because they think students have a right to express their opinions on social and political issues in school. In your opinion, should school districts ban students from wearing articles of clothing with statements about social or political issues printed on them?

In your essay, take a position on this question. You may write about either one of the two points of view given, or you may present a different point of view on this question. Use specific reasons and examples to support your position.

Form 70C (June 2012)
Too Normal

English	Math	Reading	Science
1) D	1) C	1) B	1) B
2) G	2) H	2) G	2) G
3) A	3) D	3) D	3) A
4) G	4) J	4) H	4) J
5) A	5) C	5) C	5) A
6) H	6) H	6) F	6) G
7) B	7) B	7) A	7) C
8) H	8) J	8) J	8) J
9) A	9) D	9) A	9) D
10) F	10) F	10) H	10) H
11) A	11) D	11) B	11) C
12) J	12) F	12) F	12) H
13) A	13) E	13) B	13) A
14) H	14) G	14) H	14) H
15) D	15) E	15) D	15) D
16) G	16) G	16) J	16) F
17) C	17) E	17) B	17) C
18) F	18) G	18) F	18) G
19) D	19) C	19) C	19) D
20) J	20) J	20) J	20) F
21) A	21) C	21) C	21) D
22) F	22) G	22) J	22) H
23) D	23) A	23) D	23) A
24) H	24) F	24) G	24) G
25) D	25) A	25) A	25) C
26) G	26) K	26) G	26) G
27) B	27) C	27) A	27) A
28) J	28) G	28) F	28) J
29) A	29) B	29) D	29) B
30) J	30) K	30) G	30) G
31) B	31) B	31) C	31) C
32) H	32) K	32) G	32) G
33) B	33) B	33) B	33) B
34) G	34) K	34) F	34) F
35) A	35) B	35) C	35) A
36) G	36) K	36) F	36) J
37) D	37) D	37) D	37) C
38) H	38) H	38) J	38) G
39) A	39) D	39) C	39) A
40) F	40) J	40) G	40) J
41) B	41) E		
42) J	42) F		
43) B	43) C		
44) H	44) G		
45) A	45) B		
46) H	46) F		
47) D	47) E		
48) F	48) J		
49) B	49) A		
50) H	50) F		
51) A	51) C		
52) H	52) G		
53) D	53) C		
54) G	54) J		
55) C	55) A		
56) J	56) J		
57) D	57) D		
58) H	58) F		
59) B	59) E		
60) G	60) F		
61) D			
62) G			
63) C			
64) J			
65) A			
66) H			
67) A			
68) G			
69) C			
70) F			
71) B			
72) F			
73) C			
74) J			
75) B			

Explanation of Procedures Used to Obtain Scale Scores from Raw Scores

On each of the four tests on which you marked any responses, the total number of correct responses yields a raw score. Use the table below to convert your raw scores to scale scores. For each test, locate and circle your raw score or the range of raw scores that includes it in the table below. Then, read across to either outside column of the table and circle the scale score that corresponds to that raw score. As you determine your scale scores, enter them in the blanks provided on the right. The highest possible scale score for each test is 36. The lowest possible scale score for any test on which you marked any responses is 1.

Next, compute the Composite score by averaging the four scale scores. To do this, add your four scale scores and divide the sum by 4. If the resulting number ends in a fraction, round it off to the nearest whole number. (Round down any fraction less than one-half; round up any fraction that is one-half or more.) Enter this number in the blank. This is your Composite score. The highest possible Composite score is 36. The lowest possible Composite score is 1.

ACT Test 70C **Your Scale Score**

English ________

Mathematics ________

Reading ________

Science ________

Sum of scores ________

Composite score (sum ÷ 4) ________

NOTE: If you left a test completely blank and marked no items, do not list a scale score for that test. If any test was completely blank, do not calculate a Composite score.

Scale Score	Raw Scores				Scale Score
	Test 1 English	Test 2 Mathematics	Test 3 Reading	Test 4 Science	
36	75	59-60	40	39-40	**36**
35	74	58	—	38	**35**
34	73	56-57	39	—	**34**
33	72	55	38	37	**33**
32	71	53-54	37	36	**32**
31	70	52	35-36	35	**31**
30	69	51	34	34	**30**
29	68	49-50	33	33	**29**
28	67	47-48	32	32	**28**
27	65-66	44-46	31	31	**27**
26	63-64	42-43	30	29-30	**26**
25	61-62	39-41	29	27-28	**25**
24	58-60	36-38	28	25-26	**24**
23	55-57	34-35	27	24	**23**
22	53-54	32-33	25-26	22-23	**22**
21	49-52	30-31	24	20-21	**21**
20	46-48	29	22-23	18-19	**20**
19	43-45	27-28	21	16-17	**19**
18	41-42	25-26	19-20	15	**18**
17	39-40	22-24	18	14	**17**
16	36-38	17-21	16-17	12-13	**16**
15	33-35	13-16	15	11	**15**
14	31-32	11-12	13-14	10	**14**
13	29-30	9-10	12	9	**13**
12	27-28	7-8	10-11	8	**12**
11	24-26	6	8-9	7	**11**
10	22-23	5	7	6	**10**
9	19-21	4	6	5	**9**
8	16-18	3	5	4	**8**
7	13-15	—	—	—	**7**
6	11-12	2	4	3	**6**
5	8-10	—	3	2	**5**
4	6-7	1	2	—	**4**
3	4-5	—	—	1	**3**
2	3	—	1	—	**2**
1	0-2	0	0	0	**1**